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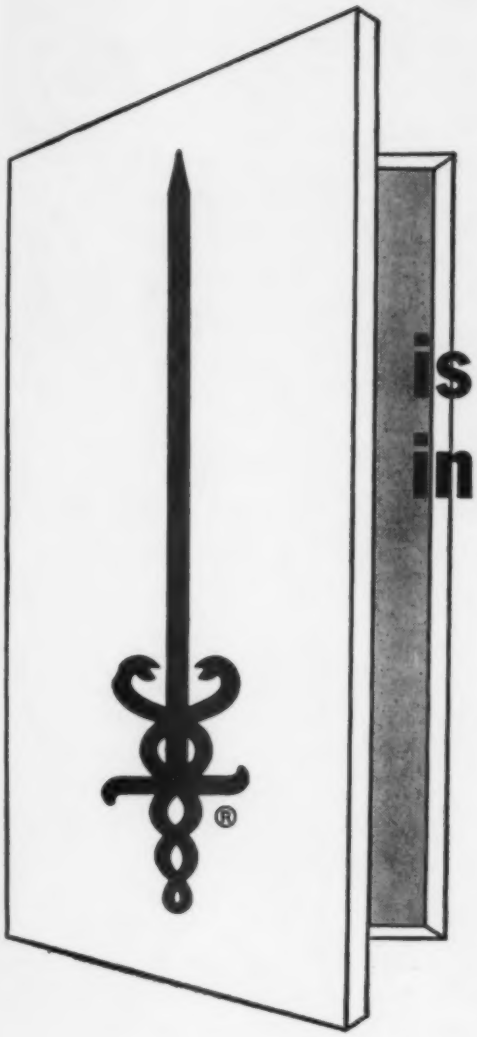

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Phil E. Adams, President of the
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VOL. 41 AUGUST, 1955 No. 8

Original Articles

A RATIONALE FOR CLOSER COOPERATION BETWEEN THE ORTHODONTIST AND THE SPEECH AND HEARING THERAPIST

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INTRODUCTION

THE orthodontist should be concerned with many areas of child development. He should know how his contribution to the total rehabilitation of a child with dentofacial irregularities dovetails with that of other specialists interested in the child, namely, the pediatrician, the speech and hearing therapist, the classroom teacher, the psychologist, and, of course, the parents.

Throughout this nation, there has been an unusually rapid growth in the training of speech and hearing specialists in the past few years. It is necessary for the orthodontists to keep astride of this progress, as many of the speech disorders are attributed to forms of malocclusion.

That is the purpose of this thesis: first, to attempt to familiarize the orthodontist with some of the problems of the speech and hearing therapist, especially those problems of dental origin and, second, to encourage closer cooperation between these two specialists while preparing the child for better physical, emotional, and social adjustment to society. With such better mutual understanding, it is inevitable that more can be accomplished for all.

Read before the Northeastern Society of Orthodontists, October, 1954, in Buffalo, New York.

This thesis, which was given as a partial fulfillment of the requirements for certification by the American Board of Orthodontics, is being published with the consent and the recommendation of the Board, but it should be understood that it does not necessarily represent or express the opinion of the Board.

According to Webster's unabridged dictionary,[1] speech is defined as "The communication or expression of thoughts in spoken words. Acoustically and organically, speech is breath or voice articulated, or formed into speech sounds, transition sounds, syllables, and breath groups, with word stress, sense stress and intonation, by definite configurations and movements of the vocal organs." This means that speech is articulated voice.

MECHANISM AND PHYSIOLOGIC ASPECTS OF SPEECH

The production of speech is by the combination of two sets of mechanisms.[2, 3] The first set is known as the vocalizing mechanism and includes the larynx and the organs of resonance, which are the chest, the pharyngeal cavity, the nasal

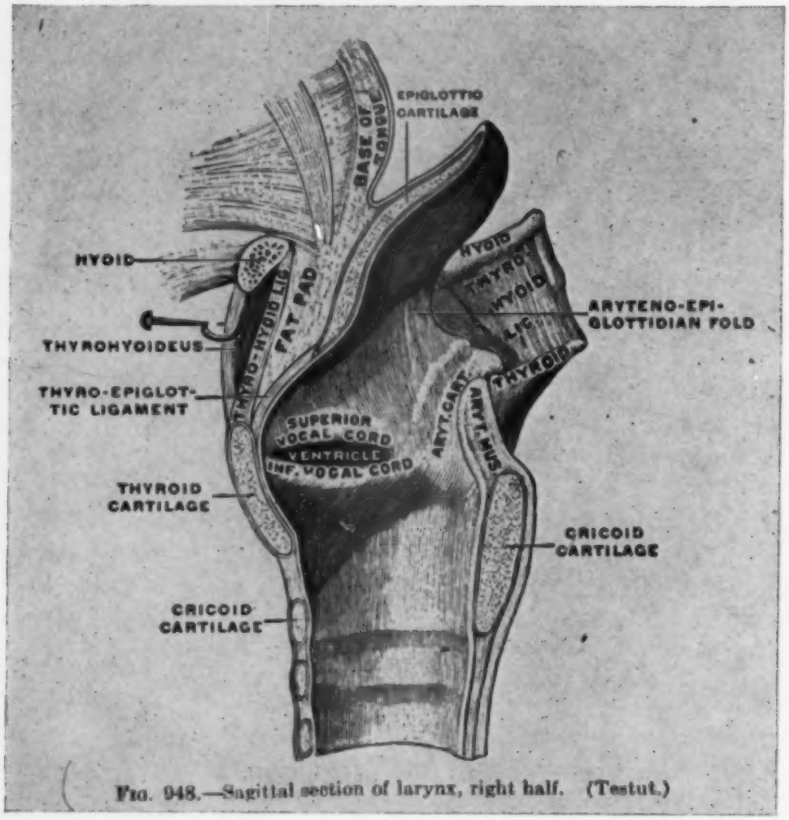

FIG. 948.—Sagittal section of larynx, right half. (Testut.)

Fig. 1.—Anatomy of larynx. (From Gray: Anatomy of the Human Body, Lea & Febiger, publisher.)

cavity, the oral cavity, and the various cranial sinuses (especially the maxillary, sphenoidal, frontal, and ethmoidal). The resonating chambers aid in the reinforcement and increase in volume of the tone. The second set of mechanisms in speech production is referred to as the mechanism of articulation. This includes the tongue, lips, teeth, and hard and soft palates.

It must be pointed out, however, that, in reality, the most important organ of speech is probably the ear. Since speech is learned in infancy through

auditory stimulation, a perfectly functioning hearing mechanism is an essential prerequisite to development of normal speech. From the beginning of babbling speech sounds of infancy to about the third year of life, the young child is constantly monitoring between his speech and hearing mechanism as he masters speech and language formations.

More and more, this concept is responsible for changing not only the title of speech correctionists to "speech and hearing therapists," but it is also changing the curriculum content in colleges and universities from "speech improvement and correction" to "speech and hearing therapy and audiology."

The larynx is very important in the production of speech and sometimes is referred to as the voice box. The larynx is situated at the upper extremity of the trachea. Its bony framework is composed of modified rings of cartilages as found in the trachea. The larynx is composed of: (1) the laryngeal cartilages, the most important of which are the cricoid cartilage, the thyroid cartilage, the two arytenoid cartilages, and the epiglottis; (2) the true and false vocal cords, which are really bands and not cords; and (3) the laryngeal muscles.

The vocal cords are attached in the front of the thyroid cartilage and, in the rear, to the arytenoid cartilages. The opening between the two sets of vocal cords is called the glottis.

The movable organs of speech are the vocal cords, the soft palate, the tongue, and the lips.

There are no speech organs, as such.[4] Each of the organs just mentioned was designed for a variety of functions. The vocal cords have the additional protective function of preventing foreign material from getting into the lungs, and that is why speech and swallowing cannot go on simultaneously.

The other physiologic components of the speech mechanism play integral parts in respiration, deglutition, and many other vital processes.

Speech is not a static phenomenon, but it is a live, dynamic process and results in definite actions performed by the organs of speech.[5]

Elizabeth McDowell[6] states: "Everything else being equal, normal speech is more likely to be obtained by a mechanism which has the following characteristics:

1. A fairly low and wide palatal arch, not too flat;
2. A tongue which approximates in width and length the general contour of the palatal arch;
3. A tongue-blade which can move freely and is not impeded by the lingual frenum;
4. Teeth which can be closed with a relatively complete obstruction of air and free from open spaces between dentures;
5. A uvula, flexible and large enough to close off the nasopharynx;
6. An absorbent lining for the oral cavity;
7. A fairly wide opening at the fauces;
8. A fairly wide oropharynx, and nasopharynx unobstructed by growths such as adenoids, etc.;

9. Comparatively large apertures at the turbinates;
10. Large nasal fossae;
11. Thyro-arytenoid folds which are long, moderately rounded, freely movable, and provided with free margins;
12. Free, agile muscles operating the soft palate, tongue, and thyro-arytenoid folds, and walls of the pharynx.

"When such conditions do not prevail, rather definite and consistent types of undesirable phonetic responses result."

Voice may be started as a column of breath of exhaled air set in vibration by its own impact with the vocal cords, and may be amplified by the addition of overtones in the resonating chambers. However, it must be modified by the action of the organs of articulation before speech is produced.

Articulation in speech is always the result of the approximation or actual contact of two or more of the articulators, that is, the tongue, lips, palate, or teeth.

CLASSIFICATION AND PRODUCTION OF SPEECH SOUNDS

The speech and hearing therapist divides all speech sounds into two classes—consonants and vowels. There are forty-three speech sounds in the English language, of which twenty-five are consonant sounds and eighteen are vowels or diphthongs. This classification is based upon whether there is a partial or complete obstruction to the outgoing breath by the organs of articulation or just a modification of the shape of the oral cavity, as is the case in production of all vowel sounds. This discussion will be limited to the consonants, since the orthodontist is mostly concerned with these sounds.

It is necessary to classify consonant sounds according to the articulators used in formation and production.[3, 7, 8] Table I has been compiled, therefore, to demonstrate this classification.

DEFECTIVE SPEECH

Following the presentation of the anatomy, physiology, and production of normal speech, a complete discussion of abnormal or defective speech is indicated in order to show why there should be closer cooperation between the orthodontist and the speech and hearing therapist.

Defective speech is "speech which attracts attention to itself because of presumable faults of articulation, breathing, rate, pitch, volume, quality, stress, expression or comprehension of the spoken word."[9]

The impact of defective speech on the listener is so great that he is often concerned to a greater degree with how the words are being uttered than with the thought of the message.

There are many methods of classifying defective speech, but one of the most practical for the orthodontist is the classifying of the disorders under three etiological headings—functional, organic, and psychological.[10] It is necessary to add that sometimes the symptoms of the disorder are quite complicated and occasionally make for overlapping classifications.

TABLE I

PLACE OF INTERFERENCE OF THE VOCAL CURRENT	FORMATION OF THE SOUND	VOICELESS OR BREATH (THE VOCAL CORDS ARE NOT MADE TO VIBRATE)	VOICED (VOCAL CORDS ARE MADE TO VIBRATE)	NASAL (LOWERING OF SOFT PALATE WITH AIR BEING EMITTED THROUGH THE NOSE)
Bilabial (Lip-lip)	Formed by the two lips	"p"	"b"	"m"
Bilabial (Lip-lip)	Formed by the two lips	"wh"	"w"	
Labiodental (Lip-teeth)	Formed by the lower lip placed against the incisal edge of the maxillary incisors	"f"	"v"	
Alveolar (Tip-gingival)	Formed by the placement of the tip of the tongue against the gingival tissue of maxillary incisor teeth	"t"	"d"	"n"
Alveolar (Tip-gingival)	Placing the blade of the tongue against the ridge of the upper teeth; the front of the tongue is raised in the direction of the hard palate but is slightly grooved along the center from back to front and the sound comes along this depression as a sort of hissing sound	"s"	"z"	
Alveolar (Tip-gingival)	Placing the tip of the tongue either against the gingival tissue of maxillary incisors or premaxillary area; the breath is expelled over the sides of the tongue		"l"	
Linguodental (Tip-teeth)	The tongue comes just to the border of the teeth but is not protruded between them	"th[1]" ("thanks")	"th[2]" ("this")	
Postalveolar (Tip-post-alveolar)	Formed by the tip of the tongue placed against the anterior portion of the hard palate	"ch"	"j" ("Jack")	
Postalveolar (Tip-post alveolar)	Raising the tongue to contact the hard palate; farther back than the gum ridge	"sh"	"zh" ("azure")	
Postalveolar (Tip-post alveolar)	By slight movement of tip of the tongue upward and backward against the roof of the mouth		"r"	
Velar (Soft palate–back)	Formed by the back part of the tongue placed against the soft palate, followed by a quick release of the back of the tongue to a flat position	"k"	"g"	"ng"
Palatal (Hard palate–front or top)	Formed by the front part of the tongue placed in close proximity to the hard palate		"y"*	
Glottal (Laryngeal)	Formed at the glottis	"h"†		

*Since the "y" position is not held, it is considered a semivowel. The stress always falls on the succeeding vowel, as in "yes," "you," and "yellow."

†An aspirate sound with no firm position of its own. The mouth always takes the position of the succeeding vowel.

The functional disorders of speech are due to a functional misuse of the speech mechanism which is capable of producing normal speech. The organic disorders are those that result from a pathologic involvement of either the speech mechanism or some related mechanism. Finally, the psychologic group includes the disorders which are predominantly emotional in nature.

Fig. 2.—Cross-sectional diagrams showing various labial, dental, lingual, and palatal relationships in the production of principal consonants.

The most frequent type of speech disorder is in the functional group and occurs as a defect of articulation. It is estimated that between 70 and 85 per cent of school children being treated by speech and hearing therapists have defects of articulation. These disorders are in the form of distortions, substitutions, or omissions of sounds. The child with this type of disorder is not always consistent in his errors. At times, his speech may include one or more of these types of errors or, intermittently, may even be normal.

The distortion of sounds is the most prevalent and consistent error that occurs as a result of a disorder in articulation. One of the most commonly distorted sounds is the consonant "s."

It is best, at this point, to review the production of the sibilants "s" and "z."[8, 11] The normal "s" and "z" sound is made by placing the blade of the tongue against the ridge of the upper teeth. The front of the tongue is raised in the direction of the hard palate, but is slightly grooved along the center from back to front, and enables the sound to move along this depression. Because the breath is compelled to go through a very narrow passage, the voiceless "s" has a hissing quality, and the voiced "z" has a buzzing quality.

The incorrect production of the sibilant sounds is frequently referred to as lisping and is further divided into two types—the lingual protrusion and the lateral emission.[7, 12] The first type is characterized by the protrusion of the tongue between the teeth with the production of the sound of "th" for the sound of "s." In the lateral emission, the air is emitted through the side of the mouth while the child tries to make an "s" or "z" sound. This gives the effect of an excess of saliva in the mouth, and it is even more conspicuous and embarrassing than the frontal lisp of the lingual protrusion type. It takes longer to modify or overcome this lateral type of lisping.

In the speech disorders resulting from the other forms of defects of articulation, both substitution and omission errors are most common in the speech of young children.[4] The child is not always consistent in these types of errors. Some examples of the substitution errors are where the child substitutes "t" for "ch," as in "too-too train" for "choo-choo train"; "w" for "r," as in "my wed twuck" for "my red truck"; "f" for "th," as in "I fink so" for "I think so."

The cause of these defects of articulation can sometimes be attributed to various organic conditions, such as the presence of a malocclusion, a high and narrow palatal vault, or a tongue marked by some degree of deviation in size, shape, or flexibility. The correction of these defects does not necessarily correct the errors of speech. Special training for the child by the speech and hearing therapist is still required. In some cases, the speech and hearing therapist can modify or correct these disorders without any treatment of the organic cause. It is still important that the orthodontist and the speech and hearing therapist develop a mutual understanding of each other's treatment problems and report their progress.

The importance of the tongue in the production of the consonant sounds is evident, since some part of the tongue articulates with some part of the hard

palate in the production of eighteen consonant sounds.[5] If the hard palate is high and narrow, the tongue may have difficulty in making the proper articulation and certain speech sounds may be distorted. When a large, flat, wide tongue articulates with a narrow, high arch, usually a lateral lisp results. In case the tongue has poor muscular coordination, it will be difficult for the tongue to make the necessary rapid and accurate movements. However, another statement must be added that, even with partial or total loss of the tongue, it has been shown that individuals talked fairly well by substituting other parts of the mouth for the tongue action. Nevertheless, some of the sounds were still absent.[2]

The speech disorders primarily of psychological etiology are found in those who are said to have blocking speech, often referred to as stuttering,[12] but more recently known as non-fluency of speech.

This defective speech has been difficult to diagnose and modify because, no matter what the primary cause may have been, the secondary symptom has set in and requires different treatment from that which would have been applied to the primary cause. The psychological symptoms must be treated with extreme caution and delicacy, and often involve the child's family and complete social situation.

The organic group of speech disorders is the third group to be discussed. This group is of prime importance to the orthodontist, since it includes speech defects due to malocclusions of the teeth and speech disorders concomitant with cleft palates. Other problems facing the orthodontist from time to time are speech disorders in children with cerebral palsy or those whose speech problem stems from an auditory impairment.

RELATION OF ORTHODONTIC PROBLEMS TO NORMAL SPEECH

The orthodontic problems most commonly found detrimental to normal speech are the protraction, diastema, or absence of the maxillary anterior teeth, Class II and Class III malocclusions (Angle), the anterior or posterior open-bite, crowded and rotated teeth, and narrow, constricted dental arches.

Estimates have been made that between 80 and 90 per cent of the people who lisp also have a dental malocclusion.[5, 6]

Normally the teeth serve as a sounding board for the sibilant sounds of "s" and "z," but if the tongue gets between the teeth it acts as a damper and thus modifies the sound produced. It is obvious, therefore, that any abnormality of the anterior teeth may interfere with the production of the sibilant sounds. Children are likely to develop a lisp if the upper central incisors have been lost and if the permanent incisors are delayed in their eruption.

Lisping in older children frequently is associated with other dental irregularities, such as Class II and Class III orthodontic malocclusions (Angle) or an open-bite.[11] If the central incisors are too widely separated, the air current escapes between them and a "t" or "d" sound takes the place of the "s." If spacing is present in the posterior segment, lateral lisping may result.

The speech and hearing therapist has his greatest challenge with the defects resulting from an open-bite. An open-bite in the posterior segment may result

in the lateral emission type of lisp, while an open-bite in the anterior segment may result in the lingual protrusion lisp; that is, a "th" sound is produced instead of the normal "s" and "z."

The patient with an anterior open-bite also has trouble with the linguodental sounds of "th" voiceless, as in "thanks," and the "th" voiced, as in "this." Another frequent speech defect occurs in the production of "ch" and "sh" sounds.

There may be various dentofacial relationship in the group of malocclusions referred to by the orthodontist as Class II, Division 1 (Angle). This discussion will deal primarily with the malocclusion which is recognized by protruding maxillary incisors, lower anterior teeth striking into the palatal tissue, and a mandibular retrusion resulting in a chinless appearance. In this type of malocclusion, there is not enough room for the tongue in all its proper articulation positions and the condition may result in indistinct speech and poorly phonated consonants. The patient may produce the "f" and "v" sounds when trying to use the voiced and voiceless "th" sounds.[6]

It is difficult for the person to position the tongue properly for the "t," "d," and "n" sounds.[8] Because of the poor muscular tonicity of the lips, the patient finds it difficult to bring the lips together for the bilabial sounds of "p," "b," and "m" and substitutes the positions normally used for the labiodental sounds of "f" and "v."

Lateral lisping usually results, in this type of malocclusion, when the person is trying to produce the "s" and "z" sounds, as there is an escape of air in the posterior segments. In trying to produce these sounds properly, the mandible is moved into a protrusive position which causes a posterior intermaxillary opening. The tongue tries to close this space, but its inability results in the air escaping laterally.

Malocclusions in the Class III (Angle) group may cause speech disorders if the lips and tongue are restricted in their movements.[8] Some of the usual speech errors are made in producing the bilabial sounds of "p," "b," and "m," the sibilants "s" and "z," and the alveolar sounds of "f," "v," "t," "d," and "n." In attempting to produce an "s" sound, the attempt is made to retract the mandible and to bring the teeth edge to edge.[13] Being unsuccessful, the person tries to substitute by placing the tongue against the incisor edges of the upper anterior teeth, and this results in a lisp.

A lesser degree of malocclusion may still cause a speech disorder because individual teeth may be in malposition and interfere with the proper positioning of the tongue, for instance, an anterior or posterior cross-bite and crowded and rotated teeth.

CLEFT PALATE SPEECH

Next in the group of speech defects due to organic causes is cleft palate speech. The location and degree of the cleft may vary and may affect all or part of the hard palate, may extend to all or part of the soft palate and uvula, and may include the anterior alveolar bone of the maxilla. Various combinations are possible. If the cleft of the lip occurs, this is known as a cleft lip.

With a cleft palate, the air passes freely between the oral and nasal cavities and causes the voice quality to be excessively nasal. The sounds affected vary with the location and size of the cleft and also the condition of the other oral structures.

There are three nasal sounds in normal English speech—"m," "n," and "ng."[5] They are formed by closing the mouth passage at some point and at the same time lowering the soft palate so that air can be emitted through the nose. For all other sounds, the soft palate should be raised against the postnasal pharynx.

That is why a cleft palate child can produce only these three consonant sounds clearly. The child often forms the correct lip or tongue position necessary for normal sound, but the majority of the air stream escapes through the nose.[4, 14] He is not able to build up pressure in the mouth for the explosive sounds of "p," "t," "k," "b," "d," "g," "wh," or "w," and they result in a nasal blend or a nasal puff. Extreme difficulty is encountered with the "s" and "z" sounds, since these sounds require the air stream to be confined to a narrow channel. The production of the "k," "g," and "ng" sounds is often impossible.

The vowels are very nasal but can be recognized more easily than the consonants. It is necessary to breathe more frequently and this causes poor phrasing. Cleft palate speech is a severe handicap to a person.

Sometimes a person without a cleft acquires certain features of the cleft palate speech by imitation of those close to him who have this defect.

Cleft palate speech also may occur in various degrees if there is some involvement of the soft palate, such as a paralysis, injury, or an unusually short soft palate.

Usually many surgical operations are performed to close the cleft and also to attempt to lengthen the soft palate. The operation is considered successful by the speech and hearing therapist when the soft palate becomes and remains resilient, flexible, and of sufficient length to be able to close off the nasopharynx with the aid of the pharyngeal musculature.[8]

After the operations, it is then necessary that the speech and hearing therapist start the speech correction program, using all three approaches of speech techniques—the visual, auditory, and kinesthetic or tactile methods.[12]

One of the important phases in the training program is to teach the child to control the direction of the air stream during speech and to prevent it from going through his nose. This is done by many exercises and speech games which are designed to strengthen the velar musculature and to teach the child to direct the breath stream out through the mouth.

Where the operation is not a success or cannot be performed, an obturator can be used but, even with this prosthetic replacement, speech training is necessary. Obturators have many limitations in the restoration of function.

Persons who have cleft palates generally have missing and displaced upper anterior teeth. If the cleft involves the alveolar process, the lateral incisors are generally missing. It is necessary that orthodontic treatment be instituted to

place the teeth in the best possible position to aid in the production of better speech. The surgical and orthodontic treatment is often done before the speech training commences, although orthodontic treatment may be done in conjunction with speech training.

ORTHODONTIC PROBLEMS OF THE CEREBRAL PALSIED AND THE DEAF AND HARD OF HEARING

Probably the most severe of the disorders in which the orthodontist and the speech and hearing therapist work together is cerebral palsy. Children who have cerebral palsy are those in whom some injury or disease before, at, or after birth results in damage to the nerve pathways which control all bodily functions.

Many cerebral palsied children have extreme deviations of the mandible due to the strong force exerted by the spasticity of facial and neck muscles. There are many orthodontic and speech problems in this group that are difficult to modify. All effort should be exerted, however, since the child has so many obstacles to overcome in order to obtain public acceptance that the revision of his facial appearance, in itself, becomes important esthetically.[15]

The orthodontist has an interesting relationship to the teacher of the deaf or hard of hearing child. First, facial contours and problems of dental alignment are equally as important to this group as they are to those with normal hearing. Second, as already shown, orthodontics has an extremely important role to play in speech production. A teacher of a deaf or hard of hearing person may work extremely hard on helping the individual to produce seemingly normal speech elements. Where dental malocclusions or other irregularities are present, much of this effort is waste motion, since ear training, especially on the sibilant sounds, is difficult to effect.

Lipreading for the deaf or hard of hearing child is difficult to master without a continuous program of instruction. With such a large percentage of words in our language having identical visible formation (homophenes), many thoughts become confused. Families of these children, together with their teachers and close associates, have the responsibility of speaking at a normal tone and rate so that mouth positions will not become distorted. However, when the people who talk to the acoustically handicapped child have dental malocclusions or other dental disorders themselves, it becomes doubly difficult for the students to obtain thought by watching the movements of the speaker's mouth. Thus, dental irregularities complicate the instructional program in both speech and lipreading for the child with impaired hearing.

CONCLUSION

Speech and hearing therapists are equipped to examine those portions of the speech mechanism readily accessible, and through this means often can determine the etiology of voice and articulatory disorders.[4, 14, 16]

The presence of an organic defect is a clue to the speech therapist for referral of the child for proper medical or dental care. His interest should not stop at referral; he should feel free to check periodically on orthodontic progress.

The orthodontist, on the other hand, does not often have sufficient background or basic understanding of the problems of speech production to participate completely in the teamwork approach to the correction of speech disorders.

A series of lectures in speech therapy at dental schools, covering information similar to that presented in this article, in addition to field trips to speech clinics, should be considered, even though it is generally recognized that the curriculum in dental schools and graduate schools of orthodontics is already enriched and would be difficult to expand.

Perhaps additional exposure to these problems during training and increased opportunity for sharing basic information in speech therapy would help in giving orthodontists more knowledge and facility in the closely allied field of speech and hearing therapy.

REFERENCES

1. Webster's Unabridged Dictionary, Springfield, Mass., G. & C. Merriam Co.
2. Greene, James Sonnett: Speech Defects and Related Oral Anomalies, J. Am. Dent. A. **24**: 1969-1975, 1937.
3. Nemoy, Elizabeth McGinley, and Davis, Serena Foley: The Correction of Defective Consonant Sounds, Boston, 1937, Expression Company, pp. 17-37.
4. Johnson, Wendell, and others: Speech Handicapped School Children, New York, 1948, Harper & Brothers, pp. 2, 4-10, 22, 88-97, 111, 286-290.
5. Ramsey, Nena Kate: Some Studies in Palatography and Skin Relation to Speech and Orthodontics, INT. J. ORTHODONTIA **23**: 109-119, 1937.
6. McDowell, Elizabeth: The Role of Speech Training in a Program of Orthodontic Treatment, INT. J. ORTHODONTIA **22**: 105-113, 1936.
7. Hawk, Sara Stinchfield: Speech Therapy for the Physically Handicapped, Stanford, 1950, Stanford University Pess, pp. 50-54, 89-98, 193.
8. Roth, George J.: An Analysis of Articulate Sounds and Its Use and Appreciation in the Art and Science of Dentistry, AM. J. ORTHODONTICS AND ORAL SURG. **26**: 1-23, 1940.
9. Ogilvie, Mardel: Terminology and Definitions of Speech Defects, New York, 1942, Bureau of Publications, Teachers College, Columbia University, p. 7.
10. Raubicheck, Letitia: Teaching Speech in Secondary Schools, New York, 1936, Prentice-Hall, Inc., pp. 193-198.
11. Seth, George, and Guthrie, Douglas: Speech in Childhood, Its Development and Disorders, London, 1935, Oxford Union Press, pp. 157-160.
12. Sturcke, Oluf: Diagnosis of Speech Defects, INT. J. ORTHODONTIA **19**: 1007-1011, 1933.
13. Hellman, Milo: A Study of Some Functional Inefficiencies of the Teeth Associated With Occlusal Anomalies, INT. J. ORTHODONTIA **3**: 275-277, 1917.
14. Van Riper, C.: Speech Correction, Principles and Methods, New York, 1939, Prentice-Hall, Inc., pp. 100, 148-150, 214-216, 402-406.
15. Palmer, Martin F.: Orthodontics and the Disorder of Speech, AM. J. ORTHODONTICS **34**: 579-588, 1948.
16. Berry, Mildred Freburg, and Eisenson, Jon: The Defective in Speech, New York, 1942, F. S. Crofts & Co.

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A NEW IMPROVED METHOD OF TREATMENT OF IMPACTED OR UNERUPTED TEETH

HAROLD E. LESLIE, D.D.S., TORONTO, ONTARIO

INTRODUCTION

THE treatment of impacted canines and other teeth has always presented a great problem to the orthodontist, as one can surmise by reading the literature on this vital subject. It is the purpose of this article to review some of the present-day knowledge on the subject and to present to the orthodontist a newer method for the practical and successful treatment of unerupted teeth.

An impacted tooth is one which is wedged between the jaw and another tooth, or one which is firmly fixed in the jaw. Some impactions are the result of abnormal growth and development and others are due to the loss of space or the drifting forward of teeth in the arch. Those impacted teeth that are due to abnormal growth factors will be considered in this article.

Etiology of Delayed Eruption or Impaction.—Upon surveying the literature on impacted or unerupted teeth, one is inclined to say that the etiology of these conditions is still a controversial subject.

Noyes,[1] in his book, *Dental Histology and Embryology*, under "The Growth of the Jaws," states:

> Each tooth germ is enclosed in a separate crypt, the wall of which is formed by a cribriform plate. The walls of the crypts are braced against each other and the cortical plates of the maxillae by spicules of cancellous bone surrounding medullary spaces. As the tooth develops within its crypt, pressure is exerted and the crypt wall is pushed backward through the cancellous bone.
>
> The force exerted by the growing tooth is the result of the multiplication of cells in the tooth germ, and is exactly comparable to the forces exerted by multiplication of cells in any position. As the tooth moves occlusally the bone grows up around it from the circumference of the crypt wall, converting it into the wall of the alveolus. The root is not fully formed and the conical pulp filling the funnel-like end exerts force by the multiplication of cells and the blood pressure, which causes the tooth to move occlusally and the bone to grow in that direction.

Since the canine tooth lies by itself in the canine segment of the maxillary bone closely related to a growth center, a lack of growth in this segment may be caused

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by an illness or systemic disturbance accompanied by high fever; this, in turn, results in retarded eruption and hence in impaction, even though the rest of the arch form may be in good occlusion.

Salzmann[2] states that "Lewis and Lehman have shown that intercanine growth in width is coincident with the eruption of the permanent incisors and canines. There is one period of active intercanine growth at the beginning of eruption of the permanent incisors and a second during the eruption of the permanent canines."

The cause of more impacted canines in females than in males is not certain. For some reason, probably endocrine in nature, there seems to be a greater frequency of impacted canines in females than in males; in fact, out of seventy-five treated cases, the ratio appears to be three or two. The upper canine is second only to the mandibular third molar in frequency of impaction. It is possible that impaction results also because of a difference in texture of the bony tissue in different persons. The unerupted canine finds it difficult to penetrate the dense, hard bone of the alveolus. Once released from these hard tissues, the eruption takes place at a fairly normal rate. After fifteen years of practice in orthodontics, I have seen only one case of lower impacted canines requiring this treatment and I have not been able to find anything on this subject in the literature at my disposal.

Hence, we will consider here, in the order of their frequency, the various types of unerupted teeth which can be aided by the type of orthodontic treatment used by me.

Some cases of impacted canines are definitely hereditary or congenital in origin because a similar condition existed ipsilaterally in one of the parents of this patient. This fact can be seen in Figs. 1 and 2.

The delayed exfoliation of the deciduous canine, or its delayed removal after the age of 9 years, tends to cause the permanent canine to be deflected lingually, since under conditions of normal growth and development the canine already lies lingually to the deciduous canine.

A crowding of the arch is frequently a causative factor for the non-eruption of teeth. If, between the ages of 10 and 12 years, it is found that there is insufficient room for the canine to erupt or the lateral incisor is rotated in any manner out of normal position in the arch, orthodontic treatment would be advisable.

The upper central incisor sometimes may be impacted or retarded because of another cause or another factor, namely, the thickening of the gingival tissues overlying the tooth. The presence of a supernumerary bud will also delay, in many cases, the eruption of the maxillary central.

Occasionally, insufficient space and thickening of the gingival tissue overlying the central incisor will also delay the eruption.

Early surgical intervention is required to prevent this condition from developing. Of course, roentgenograms should always be taken to ascertain the

reason for the delay, since treatment of the unerupted maxillary central incisor, even at 8 or 9 years of age, is advantageous. This will be discussed in this article under "Treatment" (Fig. 3).

The lower second premolars are the teeth most frequently impacted in the lower arch. In addition to the etiology already considered, the distal tipping of the premolar during development results in the leaning distally of the premolar crown beneath the mesial surface of the first molar. It will show up as a resorption of the distal root of the second deciduous molar, with the mesial root quite intact. The removal of the deciduous molar often will relieve this condition.

Another cause of the impaction of the second premolar is the early loss of the second deciduous molar, followed by a forward drift of the maxillary or mandibular first molar which causes the closing of the space that is necessary for the normal eruption of the second premolar.

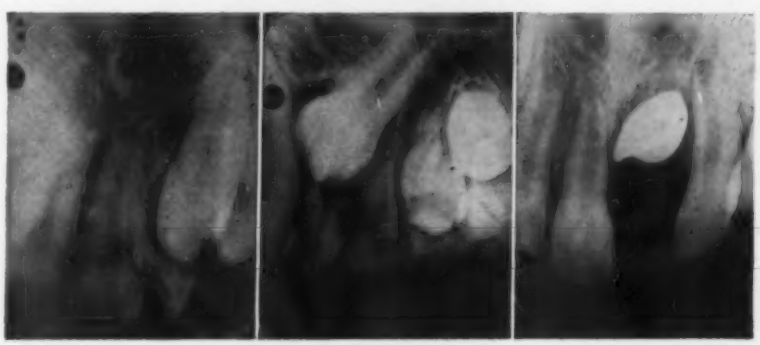

Fig. 1. Fig. 2. Fig. 3.

Figs. 1 and 2.—Ipsilateral condition on the right side in a mother and son.
Fig. 3.—Upper right central incisor lying in a horizontal position at 8 years of age.

Occasionally, the upper first molar, while not completely impacted, is found to be suppressed because of similar etiological factors, just outlined. The condition here can also be corrected quite easily by the method that I use.

Frequent X-ray Examination.—The successful treatment of the impacted teeth is dependent upon the proper evaluation of the roentgenographic examination. The orthodontist, therefore, is able today, by the use of his x-rays, to check the downward growth of these teeth. Frequent x-ray examinations should be made of these abnormally positioned teeth to follow their growth pattern and aid in deciding when treatment, if any, is necessary.

Location of Canines.—The early treatment of unerupted canines is advantageous because the alveolar bone supporting these teeth is still in a developmental stage and hence is more receptive to tooth movement.

Intraoral x-ray films are sufficient for most cases in the treatment of unerupted canines. However, occlusal films also may be necessary to determine the exact location of the unerupted tooth. These x-ray pictures should be taken in more than one plane to avoid errors.

Frequently x-ray pictures taken by stereoscopic technique are of great value in localizing the position of these teeth, particularly as to their buccolingual relationship.

There are a number of other important factors to be remembered as to the location of these impacted canines. Consideration should be given to the surrounding anatomic structures, as well as to any pathologic condition that may be present.

The position of the impacted canine may be divided arbitrarily into four categories, according to their approach to the horizontal plane. Good x-ray films are necessary to demonstrate this but, for the purpose of conserving space in this article, the illustrations have been omitted.

Fig. 4.—Upper right canine in a horizontal position.

Fig. 5.—Same tooth with the x-ray tube placed in a different angle.

Position 1: The unerupted tooth is either labial or lingual in relation to the incisor teeth, and approaches nearest to the vertical position; the majority lie lingually. When lingually placed, they are very slightly deflected from their vertical position, with the apex of the tooth lying more or less in its correct position and the tip of the crown in close approximation to the lateral incisor root or crown; this type of tooth is the easiest to bring into position.

Position 2: This canine is deeply seated on the lingual side with the root apices slightly distal of the normal, and the incisal tip may extend to a position level with the mesial surface of the lateral crown.

Position 3: This canine is completely horizontal on the lingual side of the upper incisor. Here the root apex lies as far distally as the first premolar area, or

may extend even beyond. The incisal tip of the crown of the unerupted canine is behind the upper central incisor and may even approach the midline. Most of these are deeply placed and some lie almost in the floor of the nose. It is the canines of this type that will never erupt spontaneously, even by surgical exposure, unless they can be brought down by positive traction, as I will explain later.

All those canines in Position 2 will need further orthodontic treatment to finally bring them into place in the arch, even after they erupt, for unless the axial inclination is corrected they will never stay well placed in the line of occlusion.

Position 4: The impacted canine, which is placed labial to the incisors, is sometimes hard to locate because, if deeply placed and lying well under the thickened soft tissues, it is deflected at the lip sulcus and it is impossible to detect any bulging of the labial plate. However, there is usually marked labial displacement of either the lateral incisor or both the lateral and central incisors, depending on the position of the canine, which makes their detection more or less positive. Gwinn[10] states that, in his opinion, it is impossible to bring these into place because, first, one cannot fully expose the crown surgically and, second, it is impossible to employ adequate means of traction without lip irritation. However, by using my method, it will be shown that it is possible to move these canines into position without any difficulty or irritation to the surrounding tissues or discomfort to the patient.

It has been our experience that, in the majority of cases in which the eruption of the canine has been delayed for several years, it was found to be in a position lingual to the adjacent tooth. Its position, as stated before, is inclined toward the median line, causing the tooth to come in close approximation to the apical third of the root of the lateral incisor and sometimes even to the central incisor. If allowed to remain in this position, the pressure on the root of the lateral incisor or the central incisor, caused by the forces of eruption, will resorb that part of the root which is contacted by the crown of the canine. When this occurs, in order to prevent further irreparable damage, the unrupted canine must be either extracted or brought into correct alignment by orthodontic treatment. Treatment by extraction gives an excellent opportunity for the oral surgeon to demonstrate his skill, but leaves the patient a dental cripple. Even when the extraction is skillfully done, without damage to the adjacent teeth and surrounding parts, the patient is deprived of one of the most valuable teeth in his mouth.

METHODS IN USE AT PRESENT

Angle's technique consisted of drilling a small hole in the visible portion of the tooth, that is, through the enamel into the dentine, and cementing into this small hole a small screw with loop or hook, by means of which traction could be applied to the tooth. After the tooth was brought into position, the cavity was filled with porcelain or gold.

The tendency for decay to occur around the hook, the necessity of placing a filling after the removal of the hook and, most of all, the occasional death of the pulp due to exposure in drilling the hole led to a search for some other method of procedure.

Bennett's Method.—The procedure used by Bennett was to remove the overlying soft tissues and bone and expose the crown of the unerupted tooth as much as possible. Gutta-percha was then packed between the bony wall of the crypt and the crown of the tooth, and was kept in place for several days. The tooth, thus freed of the overlying thick fibrous gingival tissues and aided by some pressure from the gutta-percha, began to move into position. This method is applicable to the more superficial types of unerupted canines, but was quite useless for those more deeply placed.

Strock's Method.—This method involves exposing the crown of the unerupted tooth as much as possible. A celluloid tooth form is then fitted over it, being trimmed as necessary. After being fitted properly, this celluloid crown form is filled with a paste made of camphor, metacresol, petrolatum, white wax, and lanolin and forced gently over the tooth crown. This paste, which hardens and holds the form in place, is changed every week for about a month. At this time, it is decided whether or not the tooth will continue to come down and whether it will require the attachment of an orthodontic appliance.

Gwinn's[10] *Method.*—One surface of the crown (it may be the labial or the lingual) and all of the incisal edge are exposed. The cavity is then packed with a dressing made of zinc oxide, three parts powdered resin, one part with eugenol as a liquid, and this is left in place for three or four days. Gwinn finds that it protects the wound, relieves inflammation and, more important, prevents the tissues from closing over the wound. He claims that any unerupted maxillary canine treated in this way will erupt by itself in an average time of eighteen months. If the tooth does not begin to move down after four to six weeks and traction is necessary, he makes a flat coil from wire, one end of which forms a hook, and cements this on the exposed surface of the crown; the application of traction is applied by an orthodontist.

Various means of attachment have been employed which use cast overlays made with rings or eyelets and wire loops set in a mass of copper cement.

Sly[8] reported, in 1950, the combination of the Strock method together with a piece of very thin band material perforated and soldered to a small ring and inserted through a slot in the form. This is tried on the tooth; the metal adapts easily to the surface and is then cemented in place.

Comment.—All these methods seemed very arduous to me, and the post-operative care following the uncovering by the surgeon of the impacted tooth presented a problem to the oral surgeon as well as to the orthodontist. The many procedures which have been advocated and the diversity of recommendations made by those who have written on this subject are in themselves testimony to the fact that no uniformly satisfactory method of uncovering and treatment has been found.

S. W. LESLIE'S METHOD OF WIRE TRACTION

To facilitate orthodontic treatment in these cases, I discussed the problem with my brother, an oral surgeon of considerable experience in oral and general surgery. As a result of this consultation, a wire traction method was devised which has been reported[3] and which has been commented on by other prominent orthodontists.[4] Having found this method successful in many ways, I shall present a short outline of the method as it was used in about seventy-five cases in the past twelve years.

This method definitely produces excellent results as to bringing the teeth into position and also accomplishes this with very little discomfort or pain to the patient. The oral surgeon can easily master this technique and only repetition is required for perfection of skill. For the orthodontist, it has improved the chances of a more rapid and succesful end result without too much manipulation. For the patient, the gravity and seeming risks of complication of the so-called uncovering operations, which heretofore have prevented many parents from agreeing to have it done on their children, have been done away with.

Diagnosis and Explanation to the Parent.—The orthodontist confronted with the problem of impaction, having made his diagnosis and decision as to the need for surgical assistance, not only sends along the history and radiographs but also now prepares the patient for referral.

A reasonable explanation is given to the child patient to eliminate any fear. In many cases the child is between the ages of 9 and 14 years. The orthodontist explains the procedure to the parent and points out that this operation is performed in the office under local anesthesia, with no pain during or after the operation. Thus, a cooperative attitude by the patient and the parent is easily obtained and the surgeon welcomes this type of referral.

Orthodontist's Role in This Method.—

1. Proper impressions must be taken.
2. Separating wires are inserted to obtain adequate separation for molar band construction.
3. Anterior bands are made when necessary.
4. Alginate impressions are taken with the molar bands in place, and models are poured.
5. The desired appliance of the operator is constructed.
6. The molar bands are cemented into place.
7. The patient is now sent to the oral surgeon.

The Leslie Technique of Wiring, or the Surgeon's Role.—The field is now prepared in the usual manner. Local anesthetic has been used in all our cases, but there is no reason why a general anesthetic cannot be used by surgeons who prefer it.

The proper incision having been made, a mucoperiosteal flap is reflected back in the region of the impacted or unerupted tooth, and the overlying bone is re-

moved until the crown is exposed. Burs or small currettes may be helpful to some operators. A piece of .010 soft ligature wire made into a loop is placed over the crown and seated at the neck of the tooth, well over the cingulum, in the case of canines or central incisors. The loop is then tightened by twisting the wire. A sulcus or trough is chiseled out in the bone of the alveolar process in the direction that the impacted tooth is intended to erupt into alignment. Necessary traction in this direction is accomplished by attaching the free end of the looped wire to the orthodontic appliance.

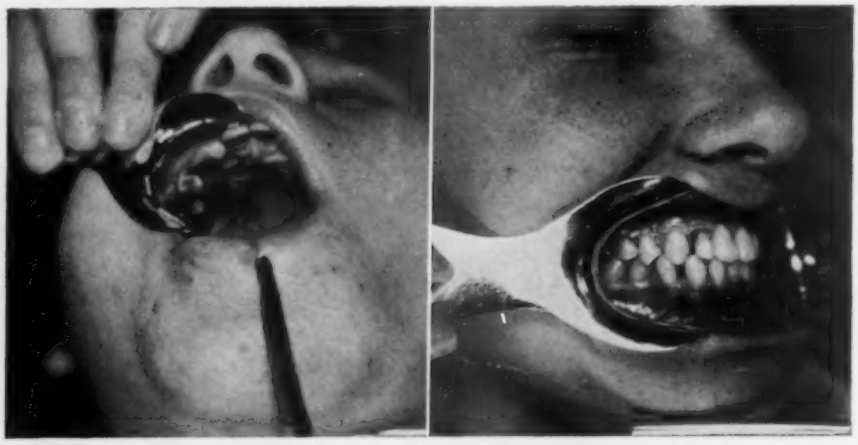

Fig. 6. Fig. 7.

Fig. 6.—Wire placed around the cingulum of the canine.
Fig. 7.—Canine in position completed after one year.

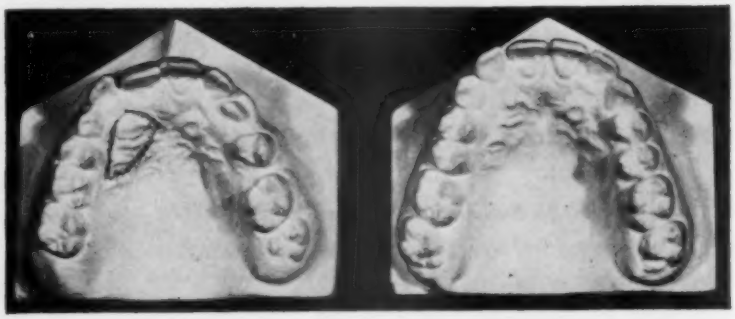

Fig. 8.—Occlusal view of another impacted canine before (*A*) and after (*B*) treatment with an outline in black where the upper right canine was lying.

Some mucous membrane is removed over the socket area and the wound is closed with interrupted sutures. These may be silk or catgut. The cavity thus formed may be packed with some medicated gauze or penicillin ointment. Suitable postoperative instructions are given. Sutures and packing, if any, are removed on the third day.

We have found no need for prescribing sedatives other than the administration of an occasional aspirin tablet.

Further orthodontic treatment in conjunction with this method can be used according to the experience of the operator, but the following points should be noted.

When using a labiolingual appliance, the labial wire is usually .038 or .040 inch in diameter. Because of the size of the labial wire, one cannot give the tooth too much traction, as it would cause discomfort to the patient in the early stages of treatment. Therefore, it is necessary to see the patient every two or three weeks at the beginning of treatment.

When using a Johnson twin arch appliance, the labial arch is made of .010 twin arch wire. With this arch, the very fine wires, in themselves, act as gentle pressure or traction on the impacted tooth and it is necessary to see the patient only once every three or four weeks. There should be no complaint from the patient of soreness or pain, but if too much force has been applied, then the patient will complain at once and the pressure must be relieved by untwisting the wire slightly.

Fig. 9.—Wire still in position on the canine. The wire is then removed simply by cutting.

If an edgewise appliance is used, this technique is started with a fine .014 or .016 inch wire and so the reaction is similar to that just described. Even with the .018 or .021 by .025 wire the patient is only seen once every four weeks. In the meantime, the orthodontist can take care of any rotations or expansion that he may desire for the patient. Any other form of treatment is done at the same time.

Since these teeth move by traction, intermaxillary elastics must be worn. It is possible to start the patient with No. 300, 301, or 302 ligature, or the standard large, medium, or small elastics. Experience leads to the choice.

No attempt is made to prevent the lingually erupting tooth from attaining complete eruption in a lingually locked position. When it is time to move the canine labially from the lingual position a small acrylic incline or block, using quick-setting acrylic, is made in the mouth and the tooth is found to move labially very rapidly. The various illustrations in this article draw attention to the fact that the wire is still in position, even though the tooth is almost in its correct normal relationship. After the tooth is almost in position, a band is made for this tooth and when the tooth is placed finally in its normal axial relationship in the arch the wire is removed.

Treatment Time.—The time required to bring the canine into position varies with the original position of the tooth, whether it is lying horizontally or partially so, or whether it is lying lingually or bucally. Also, the patient's response to stimulation will influence the length of treatment time. The state of health of the patient is of importance, since the degree of calcification of the crown and root of the impacted tooth will vary. It has been found that treatment time varies from ten to twenty months, with an average of fifteen months from the time of surgical uncovering to correct final position in the arch. The embedded wire is removed when the tooth is practically in position, or when it becomes necessary for a regular band to be placed on the tooth. This removal of the wire can be accomplished by simply cutting the wire with a scissors, as is done when removing a simple ligature, and involves no pain or bleeding. It is to be noted that no infection has ever occurred from these embedded wires.

SUMMARY AND CONCLUSION

1. A method of diagnosis and a new concept of treatment of unerupted teeth have been presented.

2. Early x-ray examination of canines should be made to ascertain whether normal resorption and exfoliation of the deciduous canines are taking place. If they are not, then the immediate extraction of the deciduous canines is recommended.

3. The malposition of some canines is congenital or hereditary in nature.

4. Any unerupted tooth not appearing in due course should be uncovered.

5. The problem of uncertainty regarding the finished result is completely eliminated by this method.

6. Fear, pain, and anxiety are completely eliminated for the patient and parent.

7. Proper and careful uncovering of these teeth by wiring and the use of traction are necessary for a successful end result.

I know of no other form of orthodontic treatment that is more gratifying and in which the results are more predictable and permanent that the correction of these impacted teeth by this method of wiring. In this manner, a great number of impacted teeth now being extracted can be saved to serve a useful function with a desirable esthetic appearance. This, therefore, results in a good occlusion of the teeth, which is the ultimate goal of the orthodontic treatment by the orthodontist.

The author wishes to acknowledge that he owes a great debt of gratitude to his brother, Samuel W. Leslie, M.D., D.D.S., for his able assistance in this research problem. Had it not been for his knowledge and skill, the above method probably could not have been devised.

REFERENCES

1. Noyes, F. B.: Dental Histology and Embryology, ed. 4, Philadelphia, 1929, Lea & Febiger, pp. 366-380.
2. Salzmann, J. A.: Principles of Orthodontics, Philadelphia, 1943, J. B. Lippincott Company, p. 255.
3. Leslie, S. W.: A New Method of Treating Unerupted Teeth by Means of Surgery and Orthodontia, J. Canad. D. A. **8**: 364-369, 1942.

4. Salzmann, J. A.: Dentistry, A Digest of Practice, Vol. 3, p. 190, September, 1942.
5. Adamson, Kenneth T.: The Problem of Impacted Teeth in Orthodontics, Australian J. Dent. **46**: 74-84, 1952.
6. Strock, M. S.: A New Approach to the Unerupted Tooth by Surgery and Orthodontics, AM. J. ORTHODONTICS AND ORAL SURG. **24**: 626, 1938.
7. Reese, B. L.: The Unerupted Cuspid, AM. J. ORTHODONTICS AND ORAL SURG. **31**: 214-220, 1945.
8. Sly, Walter J.: Unerupted or Impacted Maxillary Cuspid, AM. J. ORTHODONTICS **36**: 913-915, 1950.
9. Dewel, B. F.: The Upper Cuspid: Its Development and Impaction, Angle Orthodontist **19**: 79-90, 1949.
10. Gwinn, C. D.: Exposure of Unerupted Upper Cuspids for Orthodontic Purposes, J. Am. Dent. A. **32**: 265, 1945.
11. Lappin, Milton M.: Practical Management of the Impacted Maxillary Cuspid, AM. J. ORTHODONTICS **37**: 769-778, 1951.
12. Ennis, LeRoy M.: Dental Roentgenology, Philadelphia, 1939, Lea & Febiger, pp. 163-164.
13. La Dow, Claude S.: Oral Surgeon's Role in Management of Unerupted Teeth, AM. J. ORTHODONTICS **38**: 521-529, 1952.

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THE MOVABILITY OF VITAL AND DEVITALIZED TEETH IN THE MACACUS RHESUS MONKEY*

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THE purpose of this experiment is to observe and compare structural differences, if any, following the orthodontic movement of vital and devitalized teeth in the *Macacus rhesus* monkey.

Much animal work has been done in the field of orthodontics but, as far as can be ascertained, no experimental work has been done concerning the histologic changes that take place during the movement of devitalized teeth. A knowledge relative to histologic changes, incident to induced movement, is important to endodontists and orthodontists alike.

A brief review of past work in the field of simple orthodontic movement must include the work of the pioneer, Albin Oppenheim, who, in 1911, reported the first thorough scientific experiment on the movement of monkey teeth. His work, very precise and clear, involved the use of the plain expansion arch with ligatures. In 1925, following his lead, Johnson, Appleton, and Rittershofer[1] placed a lingual appliance in two *Macacus rhesus* monkeys. At the end of twenty-six and forty days, respectively, the animals were sacrificed. One side of each animal's jaw had been kept as a control, and the other side contained the recurve spring which gave tooth movement. The experiment demonstrated resorption and deformation at the tip of the root and also confirmed the work of Oppenheim.

Continuing his research, Oppenheim,[2] in 1935, further reported on tooth movement, this time in human beings, and compared the differences between results in animals and in human beings. It was his conclusion that the monkey responds differently, in some respects, when compared to man. It should also be noted that all the work of Oppenheim was performed on vital teeth only.

In 1942, Steadman's[3] résumé of the literature criticized root canal therapy, stating that the devitalized root acts as a foreign body causing chronic irritation and that histologic sections of such resorptions show cellular pictures such as are seen in the foreign body reaction of vital tissue. The article pointed out that the prognosis is unfavorable and that nothing could be done

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to stop the resorption of the root. It was also noted that after the root canal had been filled, the periodontal membrane often appeared indistinct in a roentgenogram and that, as a result of alternate resorption and repair occurring on the root surface, the tooth probably would become ankylosed.

These conclusions would eliminate the possibility of successful orthodontic movement of a devitalized tooth. However, this experiment has demonstrated that the devitalized tooth does not act as a foreign body, that the root resorption is minimal and is the same as that in an orthodontically moved vital tooth, that the periodontal membrane is not indistinct, and that the tooth does not become ankylosed if orthodontic treatment is instituted directly after endodontic treatment.

METHODS

The *Macacus rhesus* monkey was employed for experimental purposes because of the similarity of its dentition to that of the human being. The three animals utilized in this experiment were approximately 3 to 4 years of age, corresponding to the human age of 12 to 18 years. Their average weight was about 14 pounds. Animal A, the oldest monkey, had fully erupted canine teeth; animal B, the youngest, did not have erupted canines; and animal C, the control, had only partially erupted canines.

Endodontic therapy was performed on the anterior teeth on the left side of the upper and lower jaws of each animal. The canals of the maxillary teeth were obturated, using gutta-percha in conjunction with Kerr root canal sealer. In the mandibular teeth, the silver point technique, with sealer, was employed. In both arches, the teeth were devitalized and the root canals filled by the precise aseptic method as advocated by Sommer.[4] Bacteriologic cultures were taken with the rubber dam applied in order to insure complete sterility during the endodontic procedures. The teeth were then allowed to "rest" at least three weeks before orthodontic bands were applied. The reason for the three-week delay between the completion of the endodontic therapy and the initiation of orthodontic treatment was intentional. Since no periapical infection had been present at any time, we assumed that three weeks would be sufficient for the periodontal membrane to repair itself after endodontic instrumentation. At this point, animal C (the control) was sacrificed so that a picture could be had of devitalized teeth in a jaw before orthodontic movement had been initiated.

The edgewise technique was employed for the movement of the teeth. In animal A (the oldest experimental animal), four first premolars were removed in order to insure enough room for orthodontic movement. In the case of animal B, whose canines had not yet erupted, it was not necessary to remove the first premolars.

Brass .020 inch separating wire was placed between all the teeth; orthodontic models and intraoral roentgenograms were taken, as in standard orthodontic treatment. In each animal, we banded both arches (incisors and premolars) by the direct band technique. Molar bands, however, were con-

structed by the indirect method. In each arch, .007 inch coil springs were used as interbracket coil springs in order to provide equal forces between the teeth. Therefore, the forces exerted on vital and devitalized teeth were the same. These coil springs exerted a force of 2 ounces as recorded by a Richmond tester. An .018 inch steel round wire was used to ligate the brackets, and Thompson loops were inserted just anterior to the molar sheaths. All the foregoing work was performed under general anesthesia obtained by intramuscular injection of approximately 4.5 to 6 grains of phenobarbital. A drop

Fig. 1.

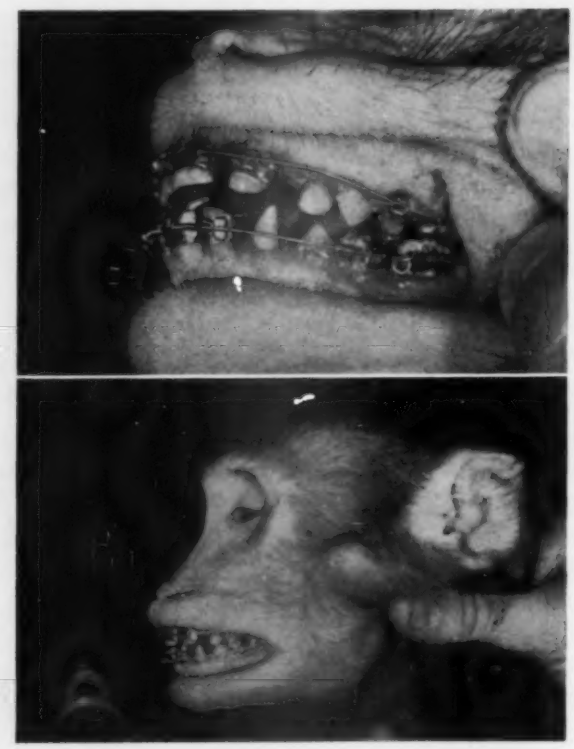

Fig. 2.

Fig. 1.—Close-up view of animal B with edgewise appliance in position.
Fig. 2.—Animal B. Side view.

of pure olive oil was placed into the eyes of each animal as soon as it had been anesthetized, and, as a preventive measure, penicillin ophthalmic ointment was also placed on the eyes. While under anesthesia, each animal received an injection of 600,000 units of penicillin G. Aureomycin, 250 mg., was incorporated in their daily diet. They were fed the Columbia University monkey diet and, in addition, were given an extra rich diet of fruits, vegetables, and milk, as well as vitamin preparations. While undergoing experimental treatment, all animals gained weight.

In order to prevent the animals from destroying the appliances in their mouths, their hands and forearms were encased in plaster casts similar to those worn for wrist fracture. Once a week the appliances were adjusted;

bands were recemented when necessary. After six weeks of active orthodontic treatment animal B was sacrificed, and at the end of eight weeks of similar treatment animal A followed. Prior to the termination of the experiment, photographs had been taken with the appliances in position (Figs. 1 and 2). After the animals had been sacrificed, the appliances were removed and final models and radiographs were taken. The jaws were then separated from the skulls and fixed in 10 per cent Formalin. After decalcification in 5 per cent nitric acid, the tissues were then cut into small squares for histologic mounting. The sections were dehydrated and embedded in celloidin and were cut at approximately 22 microns. They were stained in hematoxylin and eosin and mounted in balsam.

In preparation for microscopic examination, the jaws were separated from the skulls and divided at the midline. The four anterior celloidin blocks of each animal were then cut in serial sections on a sagittal plane mesiodistally. A total of 120 slides was made, serving as the basis of the histologic findings.

OBSERVATIONS

In both animals A and B it was found that the gross movement of vital and devitalized teeth was equivalent under the application of equal pressures. It was observed that the greatest movement of 8 mm. was obtained by moving the canines of animal A into the alveolar area formerly occupied by the extracted first premolars. This gross movement was almost identical in both the vital and devitalized areas.

Careful microscopic observations were made of the entire root areas of the devitalized teeth to determine whether or not root resorption or foreign body reaction was present. No foreign body reaction was found in any section, and root resorption was no different from that observed in vital teeth receiving the same orthodontic forces. Thus, the histologic findings showed that the vital and devitalized teeth responded similarly under the same conditions.

It was concluded from these observations that all the vital and devitalized sections of orthodontically moved teeth showed the same qualitative changes and resultant tissue modifications. However, the quantitative observations of tissue changes were not uniformly demonstrated from one section to another. One must realize that, despite the fact that the same recorded force was applied with coil spring pressure to the teeth, the animals' occlusion would influence the histologic results because of their premature occlusal contacts brought about by the repositioning of the teeth during movement.

The normal teeth of control animal C, which had received no orthodontic treatment but had received endodontic treatment of only the left maxillary and mandibular anterior teeth, will be considered first. For the teeth that had undergone no endodontic treatment, the following was observed (Fig. 3):

A. Bone: The alveolar bone was continuous and exhibited a simple layer of compact bone. Spongy bone was evenly placed around the alveolar bone and appeared to be mainly in a longitudinal direction.

B. Periodontal membrane: The periodontal membrane varied slightly in thickness throughout the whole alveolus and in some instances showed slightly greater thickening at the apex. Periodontal fibers were easily seen. Here and there blood vessels were noted.

C. Cementum: The cementum was evenly distributed. Rarely, slight cemental bays were seen, but they did not penetrate to the dentine.

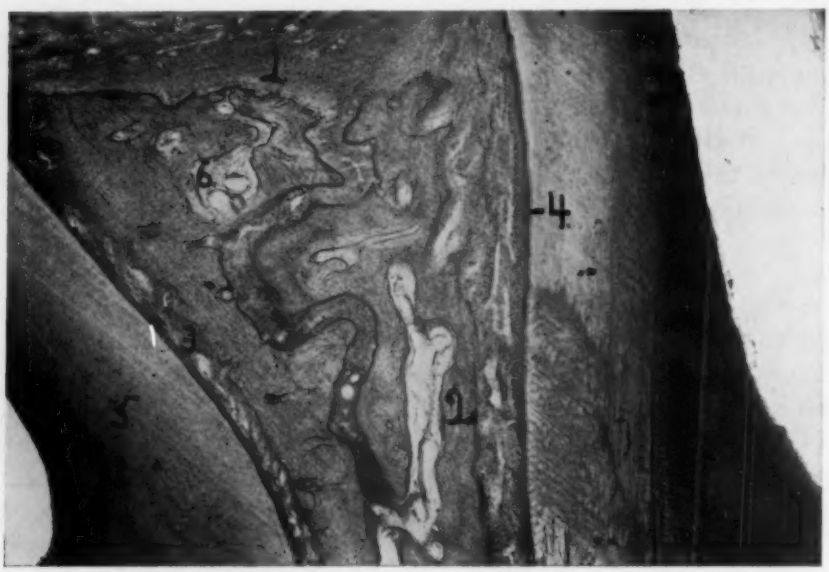

Fig. 3.—Normal tooth structure. Animal C. Maxillary anterior teeth, right side. No orthodontic or endodontic therapy has been applied.
1, Transseptal fibers of periodontal membrane; *2*, alveolar bone; *3*, periodontal membrane; *4*, cementum; *5*, dentine; *6*, blood vessels. (Magnification, ×33; reduced ⅝.)

For the teeth that had undergone endodontic treatment, no significant histologic changes in bone, periodontal membrane, or cementum were observed.

A. Bone: The alveolar bone of the devitalized tooth was continuous and exhibited a simple layer of compact bone. No osteoclasts or osteoblasts were present. Spongy bone appeared as in the normal untreated tooth.

B. Periodontal membrane: Except for minute areas of hemorrhage at the apex, the periodontal membrane appeared the same as in the normal tooth.

C. Cementum: The cementum of the devitalized tooth appeared the same as that of the normal tooth.

These findings clearly demonstrated that there are no significant histologic differences between vital and devitalized teeth, provided, of course, that the root canal procedures are carefully carried out by utilizing accepted endodontic techniques.

Animals A and B had received endodontic treatment of the anterior teeth on only the left side of both arches and orthodontic treatment of all the anterior teeth of both arches.

The following histologic results were observed in the vital teeth which had been moved orthodontically (Fig. 4):

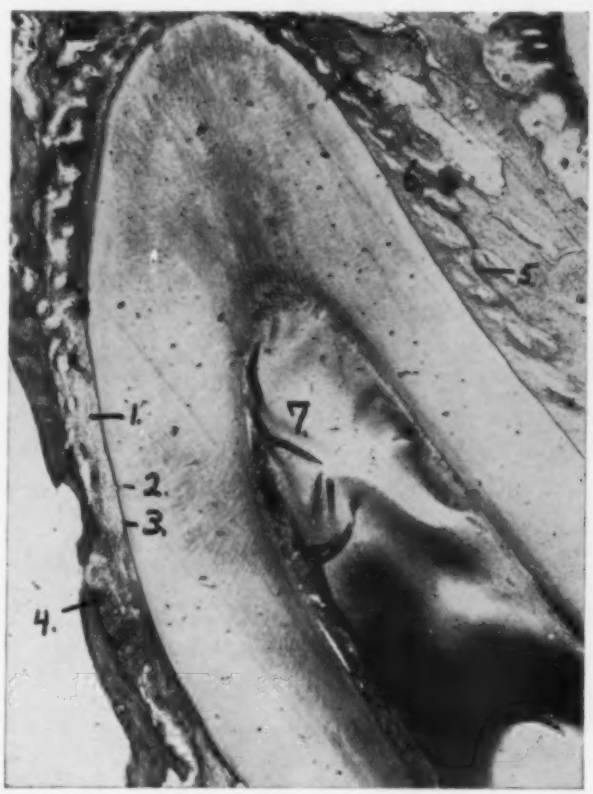

Fig. 4.—Animal B. Maxillary anterior teeth, right side. Orthodontic movement, but no endodontic therapy has been performed.

1, Compression of the periodontal membrane; *2*, resorption and repair of the cementum; *3*, cementum; *4*, osteoclastic activity; *5*, osteoblastic activity; *6*, tension of the periodontal membrane; *7*, pulp. (Magnification, ×33; reduced ⅝.)

A. Bone: On the side of compression, it was found in some sections that there was a loss of laminated bone throughout the whole length of the root. This type of bone loss was seen where there was strictly bodily movement of the tooth. Some of the orthodontically moved teeth also experienced a very moderate tipping action as well as bodily movement. In these cases, osteoclasts were seen throughout the formerly laminated bone. On the side of compression, the spongy bone beyond the lamina failed to disclose the osteoblastic activity and the laying down of new bone, which Oppenheim claimed was formed at right angles to the root to resist further orthodontic movement.

On the opposite side of the alveolus, the side of tension, it was observed in some sections that long, laminated layers of new alveolar bone, rich in osteoblasts, were being deposited. No osteoclasts were noted in this area. In some sections where there was severe stretching of the periodontal membrane, spicules of new bone were seen forming rapidly to close the wide area between the alveolar bone and the cementum. A rich blood supply was also noted in this area.

Fig. 5.—Animal A. Section of mandibular teeth that have received endodontic and orthodontic treatment.

1, Compression of the periodontal membrane; *2*, tension of the periodontal membrane; *3*, osteoclastic activity and resorption of the alveolar bone; *4*, osteoblastic activity—new bone formation; *5*, normal periapical bone—no foreign body reaction; *6*, dentine and remains of root canal filling. (Magnification, ×33; reduced ⅜.)

B. Periodontal membrane: On the side of compression, the periodontal membrane was usually compressed to between one-half to one-third its former thickness. There was a marked loss of blood supply and fiber detail. Also seen were small areas of hemorrhage of petechial size.

On the opposite side, the side of tension, in the instances where there was tooth tipping, elongation of the periodontal fibers was more marked than was the case where only bodily movement had occurred. Where there was tension, there was also a rich blood supply and much osteoblastic activity. It also appeared that the periodontal membrane fibers were attaching themselves to the newly formed bone.

C. Cementum: Very little root resorption was found. The cementum was thinner in some areas than in others, but the cemental bays that were seen were infrequent and rarely penetrated to the

dentine. These bays were seen on the side of compression, and it was noted that repair processes were in progress in some of these bays. According to Oppenheim, cemental bays penetrating almost the dentine were found in normal teeth. However, our sections of cementum of vital unmoved teeth did not uphold Oppenheim's findings on this point.

In the case of the devitalized teeth which had been moved orthodontically, the following results were observed (Fig. 5):

A. Bone: On the side of compression, there were no significant histologic differences between vital and devitalized teeth. The same was found to be true for the side of tension.

B. Periodontal membrane: No notable histologic differences were found between orthodontically moved vital and devitalized teeth.

C. Cementum: The cementum of the devitalized teeth showed no significant histologic differences when compared to the cementum of the vital teeth.

DISCUSSION

These findings are different in certain respects from those found by Oppenheim[2] and Johnson, Appleton, and Rittershofer.[1] The differences may be explained by the fact that, while these investigators worked with the same kind of animal and were attempting to show tooth movement in their experiments, their control of movement was not nearly so precise as the control achieved in this experiment.

The aforementioned investigators employed the labiolingual technique to obtain tooth movement. In order to evaluate their findings properly, one must first visualize the complex movements which are set up by the labiolingual appliance. If the pressure of a labiolingual spring is applied to a tooth, a tipping action on that tooth will result. Though there may be a question as to where the fulcrum is in this tipping movement, it is understood that the fulcrum is in the root segment somewhere above the apical third and below the gingival third of the root. It follows, then, that on the apical third of such a tooth there will be a complex histologic picture on the side of tension, where both compression and elongation will occur as a result of tipping.

Because of the difficulty in measuring finger spring pressure in the labiolingual technique used by the previous experimenters, new investigators are faced with the immediate problem of determining the small, moderate, and excessive forces used. Do some of their results actually represent undesirable tooth movement, such as root resorption and necrosis?

Forces of interference must be reckoned with in the ultimate analysis of tooth movement. Those who have worked with the labiolingual appliance recognize not only the sensitivity of such an appliance to extraneous forces, but also the need for subject cooperation so that the appliance is not damaged.

The appliance which we used brought some of these factors under greater control. An edgewise bracket was used on each of the banded teeth; a round edgewise arch wire was used and all the teeth were ligated to these arches. A careful attempt was made to set up the appliance with a minimal amount of pressure in inserting the arch wire. The brackets were carefully aligned, in view of the normally extreme angulation of teeth in the monkey.

After the arch wire had been set in the brackets, it was removed and coil springs were inserted in the interbracket spaces. The use of a passive arch wire minimized any tipping action and made for a truer force in one direction.

The bracket of an edgewise appliance definitely minimizes the backward tipping of the root. Histologic examination confirmed bodily movement of the root and, in some instances, only moderate tipping. From our observations, the tipping occurred, usually, in the middle third of the root and only rarely in the apical third.

The edgewise appliance afforded the opportunity of better controlled force, since the coil springs which were used between the brackets could be adjusted and tested with a Richmond tester. A standard force of two ounces, used in general orthodontics and conceded by most orthodontists to be a gentle to moderate force, was used. Immediately this constant measurement eliminated the puzzling question of what is gentle, moderate, and excessive force. The employment of the edgewise technique, therefore, eliminated the additional complicating factors faced by the previous experimenters.

CONCLUSIONS

1. This experiment on the *Macacus rhesus* monkey demonstrated that there is no difference between orthodontically moved vital and devitalized teeth in their gross and histologic aspects, provided that the orthodontic forces are carefully regulated and that the root canals have been sterilized, endodontically treated, and the periodontal membrane kept intact.

2. No indication of a foreign body reaction was found at the apices of any of the devitalized teeth.

In the absence of a similar experiment on human beings, one may assume that the experiment on this very closely associated animal may be compared with similar movement of vital and devitalized teeth in the human being, and that both vital and devitalized teeth of human beings and monkeys respond in the same manner to orthodontic treatment. Clinical observations seem to confirm this assumption.*

We wish to acknowledge the advice and assistance of Drs. Arthur C. Totten and Clifford L. Whitman of the Department of Orthodontics, School of Dental and Oral Surgery, Columbia University.

*Dietz,[5] who, for the past four years, has clinically evaluated the effect of orthodontic stresses on devitalized teeth in human beings, states: "Endodontically treated teeth, banded immediately after therapy or concurrently treated during orthodontic correction, are moved with equal facility in adolescents during the first two years of orthodontic treatment. Later slight resorption and ankylosis may occur."

REFERENCES

1. Johnson, A. L., Appleton, J. L., and Rittershofer, L. S.: Tissue Changes Involved in Tooth Movement, INT. J. ORTHODONTIA **12**: 889-898, 1926.
2. Oppenheim, Albin: Orthodontic Therapy and Reality, Angle Orthodontist **5**: 159-211, 1935.
3. Steadman, S. R.: Résumé of the Literature on Root Resorption, Angle Orthodontist **12**: 28-36, 1942.
4. Sommer, R. F.: Essentials for Successful Root Resection, AM. J. ORTHODONTICS AND ORAL SURG. **32**: 76-100, 1946.
5. Dietz, Victor H.: Personal communication.

THE COMPREHENSION OF DIAGNOSTIC DIFFERENTIATION OF CLASS III CASES FOR THE INSTIGATION OF TREATMENT THERAPEUTICS

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INTRODUCTION

IT IS my observation that the majority of articles that have been written recently on orthodontic diagnostics and prognostics have dealt mostly with Class I and Class II cases.

Class III cases are in the minority, but many of them present major problems from the viewpoint of corrective procedure. Complicated types are sometimes diagnostic problems, and the ideal prognostic objective may not be obtained in every case. Mild, simple, and near extreme Class III cases should be treated successfully by orthodontics. In an extreme dysgnathic anomaly, there are some who would say that the given case should be treated successfully by orthodontic therapy, while other orthodontists of equal popularity and ability would contend that the case could be corrected more successfully and ideally by instigating surgery.

STATEMENT OF THE PROBLEM

The problem in this discussion has to do with the differential diagnosis in Class III cases; that is, would these cases require only orthodontic therapy, or would they require the assistance of surgery in the corrective therapeutics?

In differential diagnostics of borderline cases, a thorough study of growth and development and of the growth centers is an important consideration. In many cases, hereditary features, even though a deviation from the normal, carry the characteristics through to the eventual morphologic growth pattern to result in dysgnathic anomalies. The endocrine influences are not easily controlled, and one should analyze and observe them for a period of time, rather than arrive at a hurried decision.

We should gather our assessment method from the ideas of men like Broadbent, Margolis, Wylie, Downs, Thompson, Noyes, Brodie, Steiner, and others who have done research along the lines of structural, functional, and developmental phenomena.

This thesis, which was given as a partial fulfillment of the requirements for certification by the American Board of Orthodontics, is being published with the consent and the recommendation of the Board, but it should be understood that it does not necessarily represent or express the opinion of the Board.

REVIEW OF THE LITERATURE

During a study and review of the literature in the Dental Library at Northwestern University, numerous reports were found of cases in which surgery, or a combination of surgery and orthodontic therapy, had been employed for corrective treatment. Some reports gave evidence that surgery was indicated and others did not, but there was very little information of the differentiation of the two types of cases. Weiss, Lentz, and Newman,[1] Dingman,[2] Winter, Winter, and Winter,[3] Barrow,[4] Reiter,[5] Cameron,[6] Sanborn,[7] Skaloud,[8] Adelstein,[9] Thoma,[10] and others give reports and techniques of surgical correction of protruding prognathic mandibles in Class III basal bone malrelation.

Lischer[11] used the term *dysgnathic anomalies* to denote gross developmental abnormalities of the dental arches, alveolar processes, and the maxilla or the mandible. He says: "The abnormalities may or may not be associated with systemic diseases, such as allergy, severe infantile disease, endocrine and nutritional disturbances or mongolism. Most of these conditions, when severe, are unfavorable for orthodontic therapy, and if undertaken, would be prolonged and difficult."

Goldstein[12] states: "Mandibular prognathism, or Class III malocclusion, has long been looked upon as one of the most severe facial deformities. Many patients afflicted with this condition have signified a willingness to face possible death rather than to continue to live thus deformed.

It is not surprising, therefore, to find early reports of surgical efforts being used to reduce the size of an overdeveloped mandible.

METHODS AND PROCEDURE

Method.—For a study of Class III cases that might or might not be corrected satisfactorily by orthodontic therapeutics, observations have been made of patients who have visited my office.

Records were kept and tabulations were made of 529 consecutive patients who came to the office for clinical examination. There were 295 Class I cases, 215 Class II cases, 14 Class III tendencies, 17 Class III cases, and 2 prognathic cases beyond orthodontic correction.

There are many methods of evaluating the anomalies in order to arrive at a final conclusion in diagnostics. The answer might better be found by, and through, cephalometric x-rays and a study of the morphology, hereditary factors, environmental growth and development, and endocrine influences.

Procedure.—Dentofacial anomalies may be the result of a single cause or a combination of causes, and they may include the teeth and their supporting tissues, the mandible, maxilla, temporomandibular articulation, and/or the bony bases.

Men differ upon just what is normal. Therefore, normal is difficult to evaluate. The bony bases are important in the discussion of the normality or abnormality of the face or denture.

The maxilla is the principal structure in supporting the upper denture, and helps to form the middle third of the face. The maxilla, itself, is very often the victim in malformation. Underdevelopment in some, or all, portions of the bone will result in an inadequate base for the upper denture.

The sphenoid bone is one of the most important anatomic structures in supporting the face, the maxilla, and, indirectly, the upper denture. On the superior surface of the sphenoid is situated the sella turcica, considered by many orthodontists to be one of the most stable landmarks from an orthodontic viewpoint. Sella, nasion, and the line, sella-nasion, are the most desirable and convenient for reference to which to relate the dentofacial structures in this discussion.

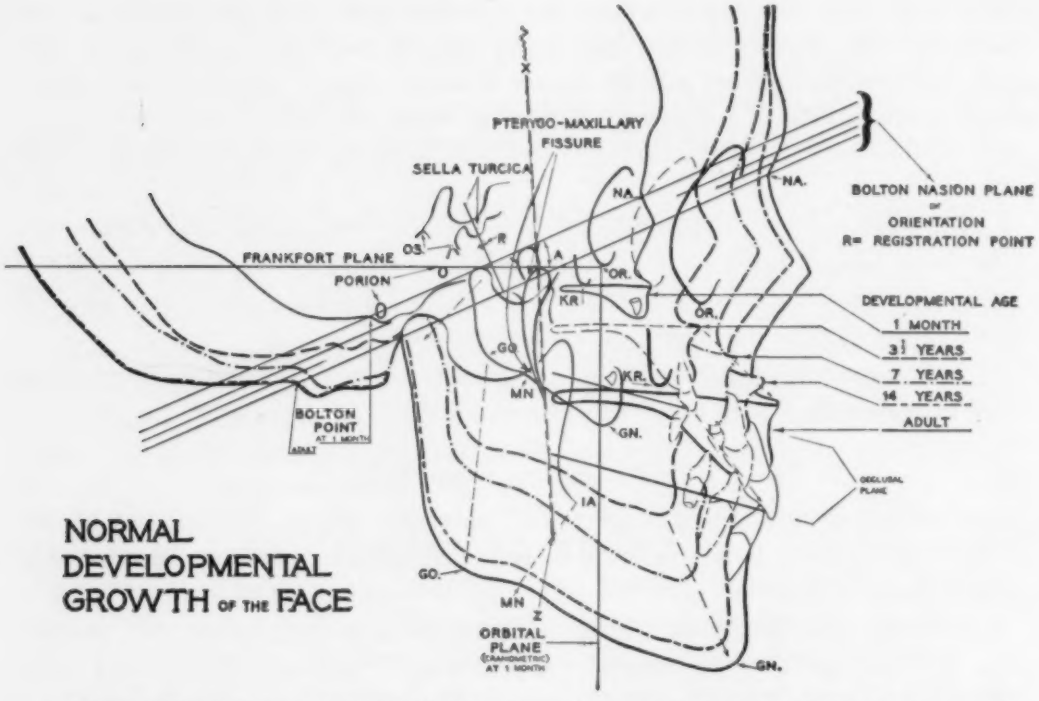

Fig. 1.—Chart of normal dentofacial developmental growth from the Bolton study records. *GN*, Gnathion; *GO*, gonion; *IA*, internal angle of the mandible; *KR*, key ridge; *MN*, mandibular notch; *NA*, nasion; *OR*, orbitale; *OS*, occipitosphenoidal suture. (Courtesy of B. Holly Broadbent.)

There is a limit to what an orthodontist can do in cases of facial distortion. In eugnathic anomalies where dentures are in Class III malrelation, improvement may be made orthodontically, even though the removal of a tooth, or teeth, in one or both arches may be necessary. Treatment by orthodontic methods in most Class III cases of eugnathic anomalies results in a compromise for articulation or occlusion. In extreme cases of Class III facial distortion, whereby the basal bones are out of proportion in size and relation (that is, the mandible being macrognathic, while the maxillary process is within the bounds of normal), it is sometimes necessary to resort to surgery to correct or reduce the anatomic proportion of the mandible.

It seems that micrognathic anomalies of the maxilla are the dominating factors in cases in which the upper incisors erupt lingually to the mandibular incisors. Such a case may be in Class I molar relation at the onset but, once the anterior teeth are in cross-bite relation, they rarely, if ever, can recover from the malrelation without orthodontic relief. If the anterior cross-bite is permitted to remain without correction, the malocclusion and adverse muscular function might develop a Class III relation of the denture and bony base.

Fig. 1 shows a chart of a "normal dento-facial developmental growth pattern," by Broadbent,[13] and it is used here, with his permission, as a norm. In order to discuss or appraise the abnormal, we must have a normal, or an ideal, for comparison. It is used here to show the normal developmental progress of the face. It can be seen that if the growth deficiency or retarded growth anomaly should occur in the maxilla or the premaxilla, from hereditary or environmental factors, the result would be maxillary micrognathia.

The cephalogram tracing also shows an excellent illustration of the mandibular growth pattern developmental progress. It can be seen here, also, that, should the mandible continue to grow to excess, the ramus and the body length would surpass normal limits and the result might be mandibular macrognathia. In either of these conditions, the result would be a Class III maxillary-mandibular relation; to what extent would depend upon what degree of malformation of the individual bone or bones.

Fig. 2 is taken from an article written by Robert W. Donovan.[14] It can be seen here, from the growth curve at gnathion, that if excessive growth should continue at the growth centers gnathion would be carried even beyond the curves that are shown. If such abnormalities should occur to an extreme degree, the condition might be beyond correction by orthodontic therapy. If the operator has a case presented for clinical examination which he suspects to be a true prognathic, and if the patient is at the age of 8 or over, he should go into a thorough hereditary history. If he finds the condition to be related to hereditary factors, he should try to ascertain the extent of the familial anomalies. If his cephalograms show excessive growth of the mandible to be in an extreme degree for the patient's age, the patient should be kept under observation, with a series of cephalometric x-rays, for at least a sufficient period of time to convince the operator of a reasonable conclusion. At the same time, the patient should be referred to an endocrinologist for a definite checkup and an analysis of his endocrine condition.

Weinmann and Sicher[15] say: "In acromegaly, growth of the mandible can again be initiated and continued even at a time when growth has normally ceased because of the peculiar histologic structure of the condyle. Here the bone in younger individuals is covered by a cap of hyaline cartilage, which is, in turn, covered by a thick layer of fibrous tissue. The hyaline cartilage, which serves as a site of growth in the same way as the epiphyseal cartilage of long bones, persists to a relatively late period and can be seen even in persons in their late twenties." They also state: "As long as this hyaline cartilage is

present, its proliferation can again be set in motion by a hyperactive pituitary gland, and it will then assume its function as a growth center of the mandible where it left off at the termination of normal growth."

If a patient is found to be out of balance, he should have endocrine therapeutics for corrective influences. The operator should also use myofunctional and chin cap therapy, with occipital anchorage, plus whatever

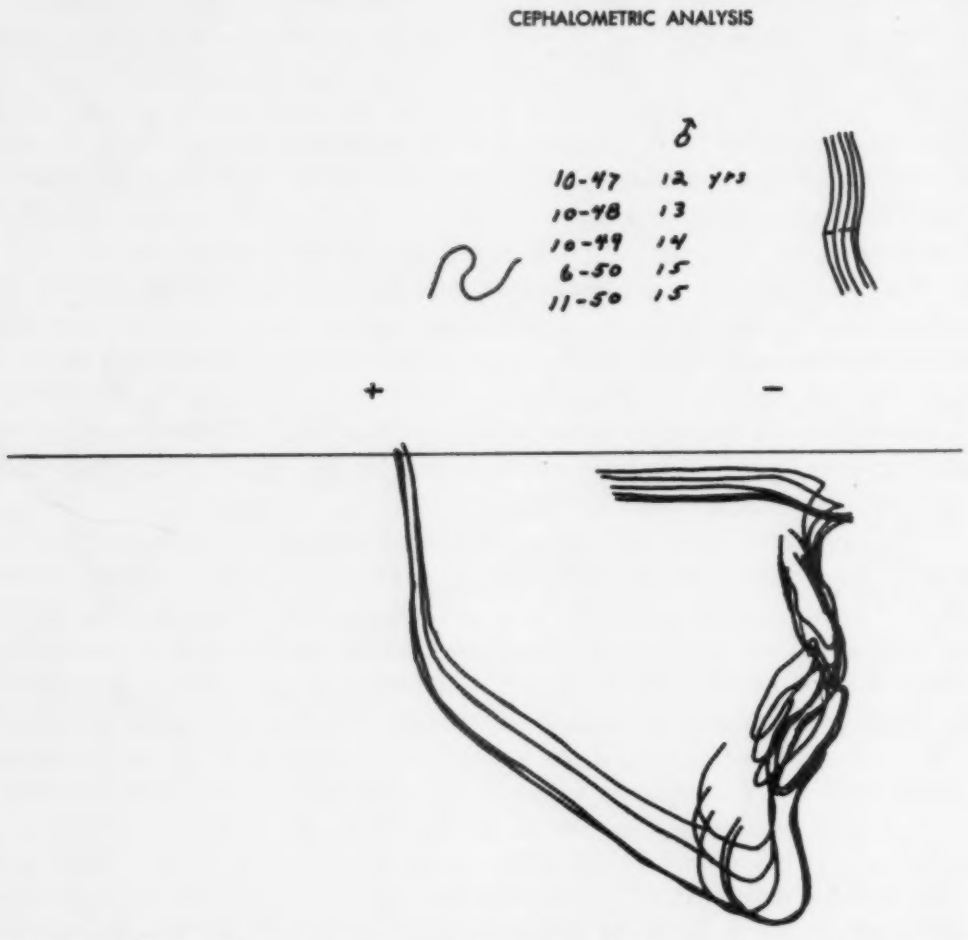

Fig. 2.—Cephalogram tracings of developmental growth of the face showing excessive growth, or prognathism, of the mandible. (Courtesy of Robert W. Donovan.)

corrective procedures are necessary to relieve or correct, if possible, the crossbite of the anterior teeth. After all his therapeutic and myofunctional resources fail to subdue the excessive growth of the prognathic feature of the mandible and the operator sees that the case is beyond his control, he might decide that the patient should have surgical correction in combination with his orthodontic work. However, surgery should not be instigated before the growth centers have practically reached their mature development.

We also find, according to Weinmann and Sicher,[16] "that if a new layer of hyaline cartilage has developed, endochondral growth can again set in

after resorption of the terminal plate. As in other bones, the periosteal appositional growth is stimulated by the growth hormone; but this growth does not keep pace with the endochondral condylar growth, and the effect is a gradual increase in the mandibular angle."

However, if the patient is found to have true acromegaly at an age when growth should be almost completed, even surgery and/or orthodontic treatment might be in vain if the hyperpituitary condition cannot be relieved or kept under control.

Steiner[17] has written an excellent article, "Cephalometrics for You and Me," in which he gives a technique for evaluating the assessments and the measurements of the dentofacial structures by cephalogram tracings. In his discussion, he uses the points, sella, nasion, and the line SN, to orientate and relate structures and data, too.

Steiner gives the following conception: "Because the points S and N are both located in hard nonyielding tissue, are directly and easily visible in a profile x-ray picture, and particularly because they are located in the midsagittal plane and therefore are displaced to a minimum degree by movement of the head, we have chosen the line SN as a reference line for all of the assessment measurements for which such a line is necessary. If it should be argued that this line is outside the face and therefore is less useful as a line from which to judge facial proportions, I would answer that in this respect it has virtue and advantage because it is used only as a common reference line, and is equally independent of facial structures. Things referring to the same thing have reference to each other."

Steiner also used a plane through the body of the mandible, Go Gn, for the mandibular plane, of which I approve. He states: "It will have been noticed that the line, Go Gn, has been taken as representing the body of the mandible (Reidel). This has been done because of the confusion among orthodontists in the matter of determining what line represents the lower border of the mandible, because such a line does not express what we desired of it. We prefer a line which more nearly represents the mass of the body of the mandible, rather than its lower border."

Fig. 3 is a series of cephalogram tracings which I have drawn. Fig. 3, *A* represents a norm. The data used in Fig. 3, *A* were borrowed from Dr. Steiner. The dimensions, lines, and degrees were used by him as a norm. The anterior-posterior over-all position and dimension of the mandible are recorded on line SN by projecting a line from the posterior point of the head of the condyle perpendicularly to the line SN. The location of this point is identified by *E*. The anterior extremity is referred to as *L*. *ESL* represents the anterior posterior dimension and position.

I have added the line, condyle-gonion (C Gn), to give a different expression of the anterior-posterior development of the mandible in millimeters.

Fig. 3, *B* shows a maxillary micrognathia, more especially in the premaxilla, and a deviation from the norm in that the upper incisors are in cross-bite or

lingual to the lower incisors. The molars are in Class I relation. Angle SNA has changed from 82 to 77 degrees. Angle SNB has changed from 80 to 81 degrees. The angle of the long axis of the upper and lower incisors has changed from 130 to 136 degrees. The anterior extremity of the mandible is shown on

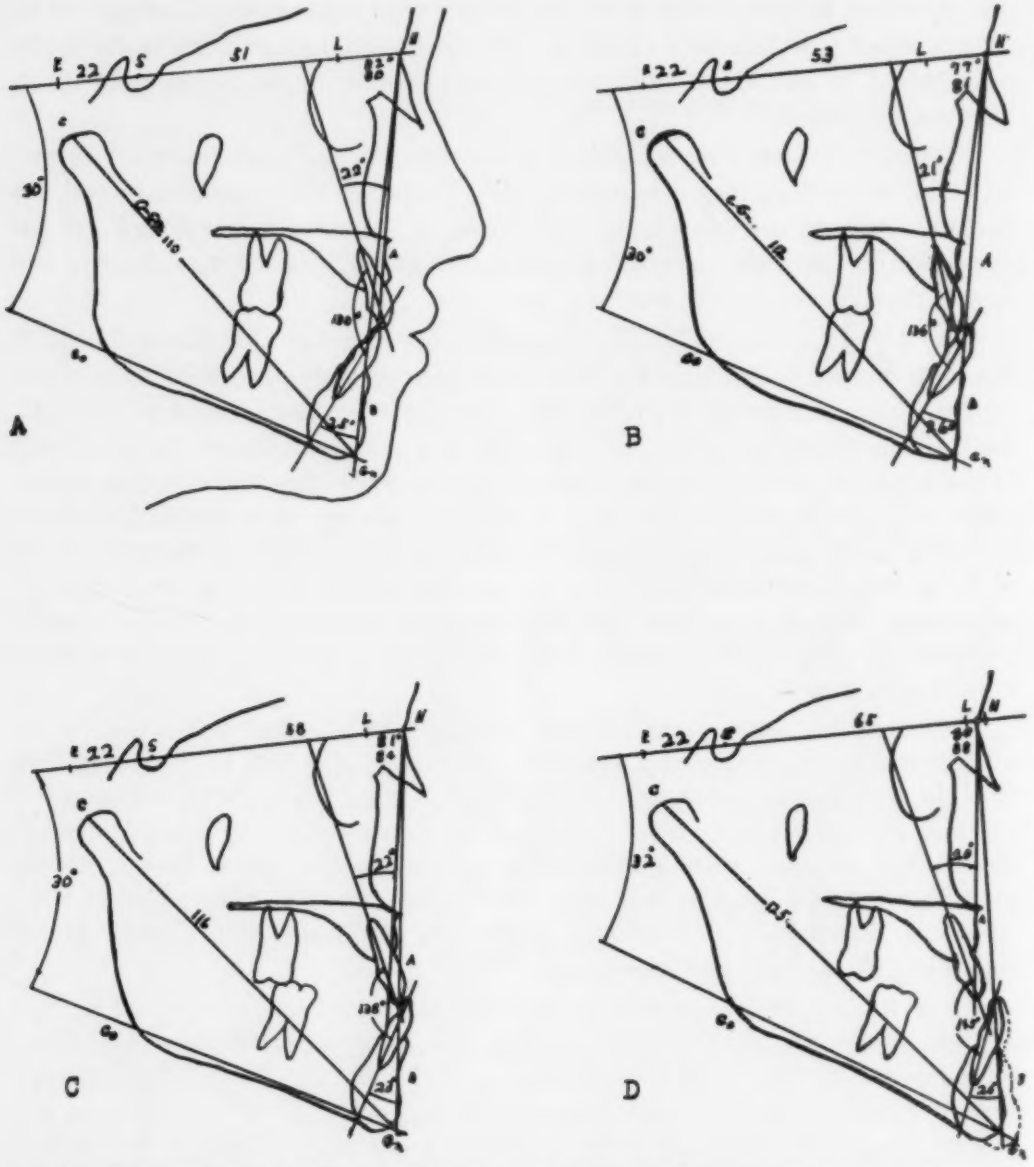

Fig. 3.—Drawings showing progressive growth developmental stages of mandibular prognathism. (Data in *A* courtesy of Dr. Cecil Steiner.)

the line SN at *L*, which has changed from 51 mm. to 53 mm. In this tracing, it is shown that the upper incisors are lingual to the lower incisors, and as growth progresses the maxillary incisors push the mandibular incisors anteriorly.

Fig. 3, *C* shows macrognathia of the mandible. The mandibular overgrowth is excessive to that of the maxillary growth, and the maxilla and mandible are

in definite Class III relation. In this instance, the angle SNA has changed from 82 degrees to 81 degrees. Angle SNB has changed from 80 to 84 degrees. The angle of the long axis of the incisors has changed from 130 to 138 degrees. The angle of the lower incisors to SNB has changed from 25 to 23 degrees, which indicates further protrusion of the lower anterior teeth. S-L has changed from 51 mm. to 58 mm. C-Gn has changed from 110 mm. to 116 mm.

Fig. 3, *D* shows a more extreme macrognathia, in that we have maxillary prognathic features as well as mandibular prognathic features, with the mandibular prognathism dominating and more prominent than that of the maxilla. In this condition, the patient might have facial features of an underdeveloped maxilla, or middle third portion of the face, due to the overgrowth and excess protrusion of the mandible.

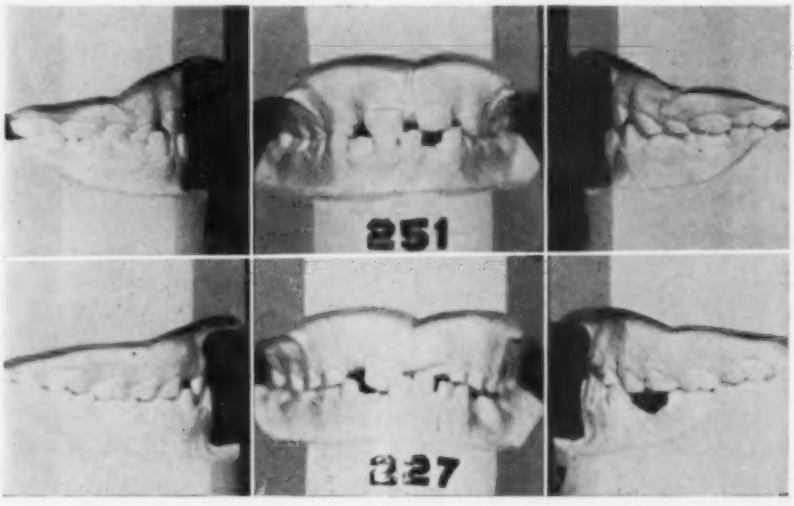

Fig. 4.—Study models of two Class I cases, with micrognathia of the premaxilla and crossbite of the incisors. These cases are the same type as shown in Fig. 3, *B*.

The angle SNA has changed from 82 to 84 degrees. The angle SNB has changed from 80 to 88 degrees. The angle of the upper incisors to the lower incisors has changed from 130 to 145 degrees. The angle of the upper incisors to SNA has changed from 22 to 20 degrees. The anterior extremity of the mandible has changed position of the *L* point on the line SN. Now the dimension CL reads 65 mm. instead of 51 mm. C to Gn has increased from 110 mm. to 125 mm. The angle SN to Go Gn has changed from 30 to 32 degrees. The asymmetrical relation of the first molars and the upper and lower dentures, plus the malrelation of the bony bases and the extreme protrusive position of gnathion of the mandible, indicates an extreme Class III case. The dotted lines at gnathion represent a further growth that could occur, due to endocrine or other growth stimuli.

Fig. 4 shows two sets of models. Case 251 is a 7-year-old girl and Case 227 is a boy, aged 9 years. The children are brother and sister. These are

Class I cases with micro-premaxillary processes, where, even at the ages of these two, the mandibles appear to be large. Both patients had cross-bites of the anterior teeth, and Case 251 also had a cross-bite on the right side. The features reveal Class III tendencies. These cases are the same type as shown in Fig. 3, *B*. Similar cases are not unusual and, if the cross-bite relation is corrected at an early age, they may not require later corrective treatment.

The simple, or false, Class III case should be easily corrected orthodontically. In cases of maxillary disgnathia, where the maxilla is slightly posterior in position to its normal base or where the underdevelopment of the premaxilla exists, the upper incisors may close lingually to the lower incisors.

A micro-premaxilla is usually a hereditary feature and if the anterior cross-bite condition is permitted to remain until the person is an adult, the case will usually develop into a definite Class III malocclusion. The mother of these two children is about 35 years old and she has a definite Class III denture relation. The history of these cases, plus clinical evidence, is sufficient to warrant a decision that, at the age of 10 years, the mother had the same condition that the children had when they reported for clinical examination.

Fig. 5 shows the before and after models and photographs of Case 280, a boy who was 12 years old at the beginning of treatment. The length of treatment time was sixteen months.

Fig. 6 shows the before and after models and photographs of Case 234, a girl who was 16 years old at the beginning of treatment. The length of treatment time was twenty-eight months.

Cases 280 and 234 show typical Class III denture relation. Case 280 had a complete cross-bite; all the maxillary denture closed lingually to the mandibular teeth. Case 234 had a cross-bite from the left second molar around to the right canine. Both cases were typical of the type shown in Fig. 3, *C*. Cases of this type usually respond satisfactorily to orthodontic treatment. These two were within the physiologic norm, except that both had underdeveloped premaxillae. These two cases were practically identical from an orthodontic standpoint.

Case 280 was started at the age of 12. At that age, his growth and developmental centers were functioning well. This case responded and reacted to treatment ideally. Case 234 was handled with the same type of appliances and treatment procedure but, due to the age factor of Case 234, there had been an exhaustion of almost all growth developmental and eruptive forces of the teeth and basal bone. To reach the same objective as that of the boy, the girl's case required more intensive treatment over a longer period of time, due to non-cooperation, the lack of growth and developmental influences, and possibly some degree of endocrine anomaly.

Fig. 7 shows a photostatic copy of a plate taken from a second edition of Case's *Orthopedia*.[18] The reproduction of this plate is entered here for the purpose of showing extreme prognathism. On studying Fig. 7, we realize there must be a margin of differential orthodontic diagnosis in Class III cases or prognathic anomalies.

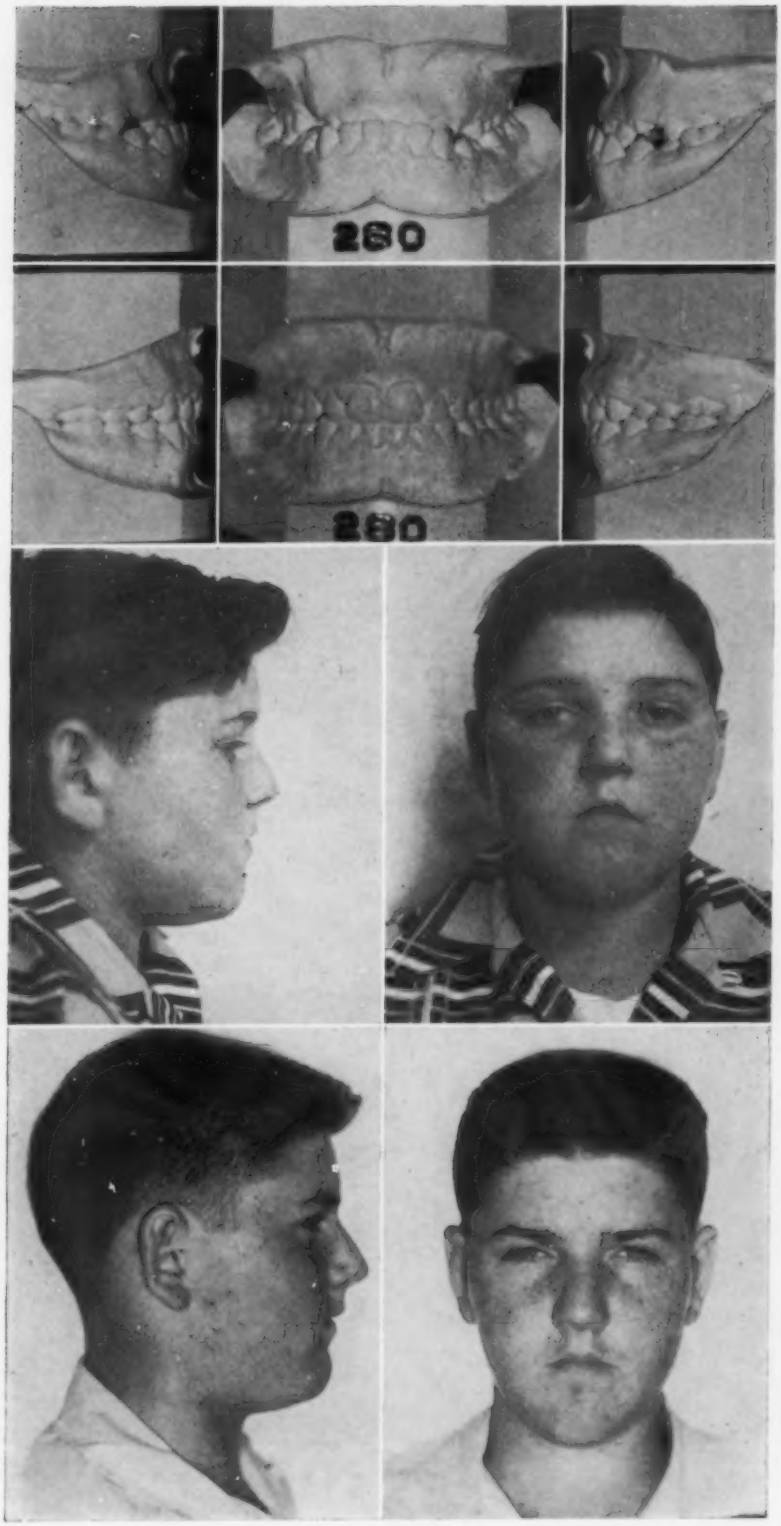

Fig. 5.—Case 280. Before and after study models and photographs. This case is identical to Fig. 3, *C*.

Fig. 6.—Case 234. Before and after study models and photographs. This case is identical to Fig. 3, *C*.

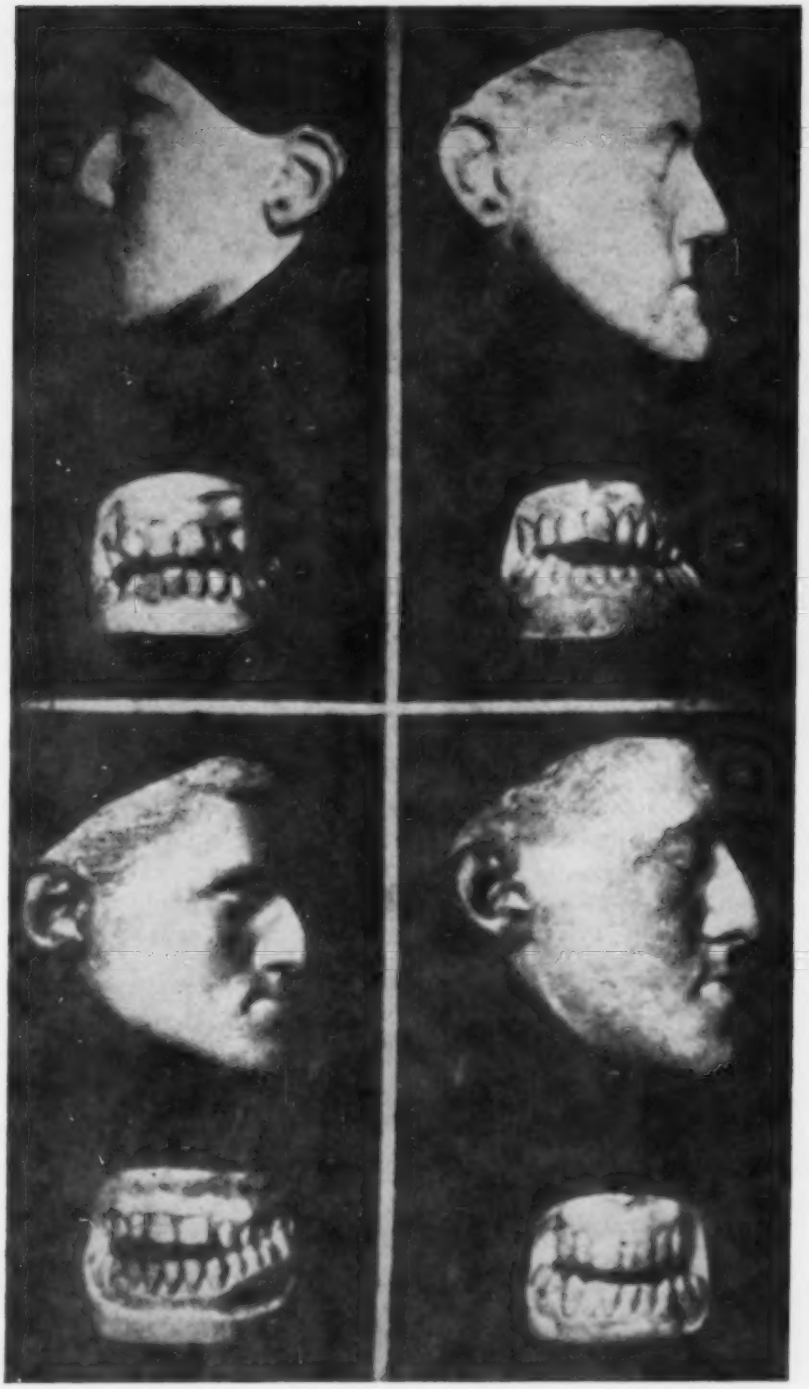

Fig. 7.—Extreme prognathism. These cases would be classified as the type illustrated in Fig. 3, *D*.

These are open-bite cases and, from a profile view, it can be seen that the different mandibles are extremely overdeveloped and abnormal in size and anatomic form. The cases shown in Fig. 7 would be classified as the type illustrated in Fig. 3, *D*.

To evaluate the anomalies of a Class III case in which there is a question as to whether it should be undertaken for correction by orthodontic therapy only or whether surgery would be advisable, the following anatomic structures and relations should be considered:

1. Anterior-posterior relation of the upper and lower dentures.
2. Anterior-posterior relation of the upper and lower posterior arch segments.
3. Anterior-posterior relation of the anterior arch segments.
4. Anterior-posterior relation of each denture to its own individual base.
5. Anterior-posterior relation of the upper and lower denture bases.
6. Anterior-posterior relation of the basal bones.
7. Abnormality of the bony bases and the extent of the distortion.

If it is the opinion of the operator that the gross malrelations of a case are such that the upper and lower dentures cannot be rearranged and repositioned by orthodontics in such a manner that the patient will have a comparable functional occlusion plus an acceptable improvement in esthetics, it might be wise to call in consulting talent and to try to arrive at a favorable conclusion from the patient's standpoint.

A very valuable step in differential diagnosis of surgical or nonsurgical cases is to make a study set-up. Remove all the upper and lower teeth which are in cross-bite and/or rotated from a set of study models. Set the teeth up, reorientating and arranging them to the bony bases; observe the degree of anomaly; and check to see if an acceptable prognosis could be obtained, even by compromising.

SUMMARY

In orthodontics an error in diagnosis of Class III cases of macrognathia, with excessive mandibular prognathism, may mean an error in attainment of a favorable prognosis.

A thorough analysis and appraisal of all familial, physiologic, and radiological data related in the case should be made before arriving at a conclusion in diagnosis.

REFERENCES

1. Weiss, Benjamin, Lentz, M. J., and Newman, Julius: Correction of Severe Mandibular Protrusion by Osteotomy of the Rami and Orthodontics, AM. J. ORTHODONTICS AND ORAL SURG. **27**: 1-6, 1941; J. New Jersey D. Soc. **12**: 19-26, 1941.
2. Dingman, R. O.: Osteotomy for the Correction of Mandibular Malrelation of Development Origin, J. Oral Surg. **2**: 239-259, 1944.
3. Winter, Leo, Winter, Richard E., and Winter, Leo, Jr.: Surgical Correction of Prognathism of the Mandible, Oral Surg., Oral Med., and Oral Path. **2**: 1506-1521, 1949.
4. Barrow, G. B.: Orthodontic Considerations in the Surgical Management of Developmental Deformities of the Mandible, AM. J. ORTHODONTICS **36**: 121-134, 1951.

5. Reiter, Edward: Surgical Correction of Mandibular Prognathism, Alpha Omegan **45**: 104-109, 1951.
6. Cameron, J. R.: Bilateral Resection of the Mandible to Correct Prognathism, J. Oral Surg. **6**: 69-71, 1948.
7. Sanborn, R. T.: Surgical Correction of Mandibular Prognathism, Penn. D. J. **53**: 4-7, 1951.
8. Skaloud, Francis: New Surgical Method for Correction of Prognathism of the Mandible, Oral Surg., Oral Med., and Oral Path. **4**: 689-694, 1951.
9. Adelstein, C. S.: Orthodontic and Surgical Correction of a Class III Malocclusion; Reports of a Case, AM. J. ORTHODONTICS **38**: 704-708, 1952.
10. Thoma, K. H.: Pathology and Treatment of Developmental and Acquired Deformities of the Jaws, J. Ohio D. A. **26**: 160-168, 173, 1952.
11. Lischer, Benno E.: Diagnosis of Facial Deformities, J. Am. Dent. A. **20**: 17-23, 1933.
12. Goldstein, A.: Appraisal of Results of Surgical Correction of Class III Malocclusions, Angle Orthodontist **17**: 59-91, 1947.
13. Broadbent, B. Holly: The Influence of the Third Molars on the Alignment of the Teeth, AM. J. ORTHODONTICS AND ORAL SURG. **29**: 312-330, 1943.
14. Donovan, Robert W.: A Radiographic Cephalometric Consideration of Facial Growth During the Orthodontic Treatment, AM. J. ORTHODONTICS **5**: 340-357, 1953.
15. Weinmann, Joseph P., and Sicher, Harry: Bone and Bones, St. Louis, 1947, The C. V. Mosby Company, pp. 198-199.
16. Weinmann, Joseph P., and Sicher, Harry: Bone and Bones, St. Louis, 1947, The C. V. Mosby Company, pp. 199-200.
17. Steiner, Cecil C.: Cephalometrics for You and Me, AM. J. ORTHODONTICS **39**: 729-755, 1953.
18. Case, Calvin S.: Calvin S. Case's Orthopedia, Chicago, 1921, C. S. Case Co.

503 NORTH "N" ST.

Editorial

Public Relations

DURING 1954, the health services suffered quite a surprise blow to their public relations department. So devastating was this impact upon the self-respect of the American Medical Association and the American College of Surgeons that they quickly held a much-needed conference to talk about public confidence. It is understood that other meetings are yet to follow in the hope that something can be done in the way of repair of the damage done.

It seems that the thing that sharply shocked the medics to a new awareness of their public relations responsibilities was the fee-splitting and ghost surgery charge that appeared in the newspaper and magazine headlines. Notwithstanding how infrequently these irregularities may actually occur in the health professions, one thing is certain—the entire group did suffer much chagrin by the obvious practices of a very small minority of nonconformists.

Dentistry, fortunately, has not been singled out and headlined for any such spotlight; however, at San Francisco in May, 1955, Dr. Fred West, in his presidential address before the American Association of Orthodontists, did (inferentially at least) wave the finger of caution when he suggested the appointment of a special committee to "study and report to the Board of Directors of the A. A. O. a plan for better methods of handling the transfer of patients from one orthodontist to another, and from one part of the country to another." He pointed out, in making this recommendation, that two constituent societies are now working on this problem. This indicates that it is a major problem and greatly in need of attention.

Correspondence exchanged with regard to this subject reveals that the problem is very important and that in some instances it has reached nearly catastrophic proportions. Some have coined a name for this bad handling of transfer cases; they call it "orthodontic brain washing." Too often parents are shocked into the realization that their child is caught "in the wringer" between two crusading factions of orthodontic concepts and procedures, each devoted to some particular mechanical craft. The parent often feels that the public welfare angle is being ignored; that prejudice has developed into belief and sometimes even into a crusade. Considerable evidence plainly reveals that a chain reaction is often started following a transfer. The routine takes place about as follows: The orthodontist to whom the case is referred may reveal indifference or aloofness to continuation of treatment. The next step is usually a letter or long-distance telephone call to the previous orthodontist by the

parent, complaining bitterly and ending with the question: "What do we do now?" The original orthodontist, who usually has the patient's confidence, is thus put on the spot and the parent is both incensed and disgusted. The circumstance explodes both confidence and friendships, and the entire specialty is made to appear sophomoric and adverse to its public obligations and professional courtesy. In fact, the general impression or reaction to such a set of circumstances is always one that inspires a tongue-in-cheek atttiude.

Those who have written and talked about professional ethics for years say that it is unforgivable for one professional man to castigate and denounce another because of different concepts of treatment. This is regarded as prejudice and personal intolerance.

Malpractice is quite something else, however. One person alone should not presume to be the judge and jury of malpractice per se, and few have the temerity to pose as such.

Much of this circumstance seems to stem from the very beginning of orthodontics and from the mechanical nature of the subject. Back in 1887 (so it is recorded), the first meeting of specialists in Washington, D. C., broke up in a rather acrimonious debate over who had the best and the first priority on gadgets for "regulating" the teeth. It seems to have been impossible, through the years, to cast off this traditional tendency for workers to become religiously dedicated to some particular mechanical device. This probably will continue on and on for some years to come, because past conditions of servitude, heredity, and environment have set a pattern.

Some of these transfer situations have been referred to attorneys and to the Ethics Committee of the A. A. O. However, this is something for orthodontists themselves to solve before it gets out of hand. As far as the new generation is concerned, much of the answer undoubtedly lies in orthodontic education and in the hope that education will become more formal and standardized.

As to the mechanical craft department, if students are taught the several popular orthodontic techniques instead of one or two, no doubt much of this difficulty will cure itself. Until that time arrives, the committee that President West suggests undoubtedly can do something constructive to pinpoint the public relations department of orthodontics. It can do much to take the pressure off the Ethics Committee and the officers of the A. A. O.

There can be no place in the scheme of any department of any modern health service for a situation wherein one certified operator is unable to replace another specialist because of a divergence of background in education or an overdedicated indoctrination, prejudiced to some particular appliance or another, its record of service notwithstanding.

If you have read this far, you will probably say "O.K., but suppose the original doctor transfers a case and sends no records, casts, or diagnosis, and treats the matter with indifference, and expects the new man to go ahead without further ado." One answer to that might be that this would be a rare incident indeed. However, if it does happen, the original orthodontist's education is scant and can be quickly alerted about ordinary courtesy and public relations.

It is to be hoped, notwithstanding, that the new committee suggested by Dr. West, after careful study, will come up with some constructive suggestions in order to help orthodontics bypass its most dangerous and inexcusable public relations hazard at this time.*

Much is heard about preventive orthodontic measures. Here is preventive measure No. 1, as yet sans the spotlight of publicity.

H. C. P.

*Since this editorial was written, it has been learned that the committee appointed to study this question and report back to the A.A.O. is composed of the following: Herbert Jaynes, Atlanta, Georgia; Eugene Kelly, Trenton, New Jersey; and Scott T. Holmes (chairman), Muskegon, Michigan.

The Fifty-first Annual Meeting of the American Association of Orthodontists

THE 1955 MEETING OF THE AMERICAN ASSOCIATION OF ORTHODONTISTS

THE unique and beautiful city of San Francisco, California, the host city for the fifty-first annual session of the American Association of Orthodontists, displayed all its charm in weather most suitable for the occasion.

The program for the meeting, which was held at the Fairmont and Mark Hopkins Hotels, was as follows:

Monday Morning, May 9, 1955

INVOCATION. The Reverend Joseph D. Munier, Ph.D.

ADDRESS OF WELCOME. Willard C. Fleming, dean of the College of Dentistry, University of California, San Francisco, California.

RESPONSE. Philip E. Adams, Boston, Massachusetts, president-elect of the American Association of Orthodontists.

PRESIDENT'S ADDRESS. Frederick T. West, San Francisco, California.

SCIENTIFIC PROGRAM (George W. Hahn, program chairman, presiding).

Changing Facial Form. Spencer R. Atkinson, Pasadena, California.

Dr. Atkinson demonstrated, by lantern slides and osteologic material, the interrelations of function and form of the human jaws during the span of an average life.

A Roentgenographic Cephalometric Analysis of Cephalo-Facial-Dental Relationships. (The Prize Essay of the Research Essay Contest of the American Association of Orthodontists.)

Viken Sassouni, D.D.S., University of Pennsylvania, Philadelphia, Pennsylvania.

THE GOLDEN ANNIVERSARY LUNCHEON. This popular activity was presided over by G. Hewett Williams. Five new members were inducted into membership in the Golden Anniversary Group:

John L. Kaufman, New York, New York.

William W. Leslie, Fresno, California.

Simon W. Sheffield, New York, New York.

William H. Street, Richmond, Virginia.

Arthur B. Thompson, Des Moines, Iowa.

On Monday morning the ladies were the guests at a Continental Breakfast, after which they were free to spend the day in shopping and sight-seeing.

Monday Afternoon, May 9, 1955

GROUP PRESENTATION. Wendell L. Wylie, San Francisco, California, Director.

The Versatility of the Edgewise Mechanism. Robert B. Murray, Berkeley, California, William W. Paden, Alameda, California, and Eugene E. West, San Francisco, California. This panel discussed the following:

1. Evaluation of the Patient and Treatment Planning.
2. The Advantages and Disadvantages Inherent in the Edgewise Appliance.
3. The Execution of Treatment, With Records of Representative Problems.

RESEARCH SECTION (J. A. Salzmann, Chairman).

This program was conducted under the direction of the Research Committee of the American Association of Orthodontists.

The Research Committee received and reviewed the several essays submitted to the Association in competition before selecting the Prize Winning Essay read during the Monday morning meeting.

All members and guests were invited to attend this important meeting in order to acquaint themselves with the scientific investigations that are being carried on in orthodontics.

PRESENTATION OF THE ALBERT H. KETCHAM MEMORIAL AWARD TO JOSEPH E. JOHNSON of Louisville, Kentucky. Raymond L. Webster, Providence, Rhode Island, President, American Board of Orthodontics, followed by acceptance by Joseph E. Johnson.

Monday Evening, May 9, 1955

GET-TOGETHER DINNER. With the Central Section of the Pacific Coast Society of Orthodontists as hosts, this extremely well-attended event was enjoyed by all. Mr. Paul Speegle was the guest speaker.

Tuesday Morning, May 10, 1955

(Harold J. Noyes, dean of University of Oregon College of Dentistry, Portland, Oregon, Presiding)

BOLTON STANDARDS IN DIAGNOSIS AND TREATMENT. B. Holly Broadbent, Cleveland, Ohio.

Dr. Broadbent discussed the practical application of the Bolton standards in diagnosis, prognosis, prevention, and treatment of dentofacial anomalies.

THE RATES OF GROWTH OF SEVERAL FACIAL COMPONENTS, MEASURED FROM THE SERIAL CEPHALOMETRIC ROENTGENOGRAMS. Ram Sarup Nanda, Denver, Colorado.

The material for Dr. Nanda's paper was gained from study of the age changes in seven linear dimensions of the face, taken from the serial cephalometric roentgenograms of fifteen persons.

Analysis of Dentofacial Profile. William B. Downs, Aurora, Illinois.

Dr. Downs presented a practical application of a serial cephalometric study in revealing the complexity of facial growth and the effects of orthodontic therapy.

Business Meeting.

Past President's Luncheon. This was attended by fourteen of the past presidents of the A. A. O.

Tuesday Afternoon, May 10, 1955

A departure from the usual routine of programs was offered. A delightful afternoon was spent by a great number of the members with their wives and families in touring by bus in the environs of San Francisco and indulging in the hobby of "shutterbugging" for a few hours.

The ladies, again on Tuesday morning, were guests at the Continental Breakfast and spent the morning in touring the world-famous Gump's store.

Tuesday Evening, May 10, 1955

This evening was free of programmed events, so there were many smaller parties as the members visited the many famous restaurants in the area.

Wednesday Morning, May 11, 1955

The Frankfort-Mandibular Incisor Angle in Orthodontic Diagnosis, Treatment Planning, and Prognosis. Charles H. Tweed, Tuscon, Arizona.

Dr. Tweed presented visual evidence of the importance of the value of FMIA in diagnosis and treatment planning.

Inadequacy of Mandibular Anchorage. Stephen C. Hopkins, Washington, D. C.

Dr. Hopkins discussed the various compromises which may be employed to protect mandibular anchorage. He quoted the recent studies which have given us a more realistic knowledge of growth and development, and how this may be utilized to protect this mandibular anchorage.

A Critical Analysis of the Use of Cervical Traction in Orthodontics—100 Treated Cases. T. M. Graber, Chicago, Illinois.

This paper was an objective appraisal of 100 treated Class II, Division 1 malocclusions. In all cases the distal motivating force against the maxilla was supplied by an extraoral cervical appliance.

Dentofacial Growth and Development in Children Receiving Fluoridated and Nonfluoridated Drinking Water. J. A. Salzmann, D.D.S., F.A.P.H.A., New York, New York, and David B. Ast, D.D.S., F.A.P.H.A., New York, New York.

A report was rendered on the study of a total of 750 children measured along accepted cephalometric determinations.

Round-Table Luncheon. This excellent new feature was highly successful and very well attended.

Discussion Leader	*Topic*
Wayne B. Slaughter, M.D. Chicago, Illinois	Cleft Palate
Kenneth F. Terwilliger San Francisco, California	Cleft Palate
Harold Westlake, Ph.D. Evanston, Illinois	Cleft Palate
William B. Downs Aurora, Illinois	Downs Analysis
Alton W. Moore Seattle, Washington	Downs Analysis
William A. Elsasser San Francisco, California	Downs Analysis
Reed A. Holdaway Provo, Utah	Steiner Method of Cephalometric Appraisal
Wendell L. Wylie San Francisco, California	Steiner Method of Cephalometric Appraisal
Jack R. Smithers Walnut Creek, California	Steiner Method of Cephalometric Appraisal
Silas J. Kloehn Appleton, Wisconsin	Occipital Anchorage
Ernest L. Johnson San Francisco, California	Occipital Anchorage
William E. Grenfell Oakland, California	Occipital Anchorage
Carl F. Bruggeman Los Angeles, California	Occipital Anchorage
Earl R. Crane San Bernardino, California	Occipital Anchorage
Herbert V. Muchnic Beverly Hills, California	Occipital Anchorage
Joseph E. Johnson Louisville, Kentucky	Johnson Twin Arch
Leigh C. Fairbank Washington, D. C.	Johnson Twin Arch
James W. Ford Chicago, Illinois	Johnson Twin Arch
Robert B. Murray Berkeley, California	Edgewise Arch Mechanism
William W. Paden Alameda, California	Edgewise Arch Mechanism
Eugene E. West San Francisco, California	Edgewise Arch Mechanism
William S. Smith San Francisco, California	Cephalometric Equipment
James D. McCoy Beverly Hills, California	Cephalometric Equipment
T. M. Graber Chicago, Illinois	Cephalometric Equipment
Clifford L. Whitman Hackensack, New Jersey	Habits
Jesse A. Linn Los Angeles, California	Habits

Spencer R. Atkinson Pasadena, California	Habits
C. W. Carey Palo Alto, California	Faces
Emery J. Fraser Bellevue, Washington	Faces
Glendon H. Terwilliger Oakland, California	Faces

On Wednesday noon the ladies were favored with a luncheon and fashion show in the Venetian Room.

Wednesday Afternoon, May 11, 1955

The limited attendance clinics were given two times, once at 2:30 P.M. and again at 4:00 P.M. This arrangement permitted everyone to attend one limited attendance clinic and the general clinics as well.

The limited attendance clinics were as follows:

Oral Surgical Procedures in the Treatment of Molaccusions. Lyal O. Bishop, Walnut Creek, California.

Laminated Arches—Double Ribbon and Double Edgewise. Clarence W. Carey, Palo Alto, California.

Serial Extraction in Orthodontics—Early Recognition and Treatment of Dentofacial Deficiencies. B. F. Dewel, Evanston, Illinois.

Roentgenologic Localization—Techniques and Interpretations. Gordon M. Fitzgerald, San Francisco, California.

Equilibration in Orthodontics—Treatment Refined by Selective Grinding. Albert C. Heimlich, Santa Barbara, California.

The Treatment of Different Types of Malocclusion Using the Twin-Wire Mechanism. Joseph E. Johnson, Louisville, Kentucky.

Diagnosis, Treatment Planning, and Prognosis of Malocclusion Occurring in the Mixed Dentition. Charles H. Tweed, Tucson, Arizona.

The 1955 Version of "Habits Have Gotten To Be a Habit With Me." Clifford L. Whitman, Hackensack, New Jersey.

The general (table) clinics were as follows:

Clinicians	*Title*
1—David B. Ast, Director, Bureau of Dental Health Albany, New York	State Aid Orthodontic Care in the State of New York
2—Earl W. Renfroe Chicago, Illinois	Anchorage
3—Fredrick B. Lehman Cedar Rapids, Iowa	A Simplified Means of Standardizing Your Photography
4—Los Angeles Orthopaedic Hospital Dept. Los Angeles, California	Exhibit of the Los Angeles Orthopaedic Hospital Department of Dento-Facial Orthopaedics
5—Harold E. Leslie Toronto, Ontario	Successful Treatment of Impacted Cuspids
6—Denton J. Rees Portland, Oregon	A Simplified Method of Model Analysis as an Adjunct to Treatment Planning
7—D. H. Jenkins Toronto, Ontario	Analysis of Orthodontic Deformity Employing Lateral Cephalostatic Radiography

8—L. W. Robinson Youngstown, Ohio	Traumatic Occlusion and Its Prevention
9—J. Rodney Mathews Berkeley, California	An Effective and Expensive Way to Have Bubble Free Plaster
10—Arnold Wieser San Francisco, California	Soldering on Stainless Steel
11—William Elsasser San Francisco, California	Coordinate Method of Cephalometric Appraisal
12—John H. Parker Alameda, California	Retainer Repairs
13—George H. Grover San Francisco, California John H. Parker Alameda, California	Cementation
14—Edward A. Cheney Lansing, Michigan	Facial Form Analysis
15—J. Clifford Willcox Pasadena, California	The Gnathostat, Symmetrograph and Diagnostic Set-Up, in Treatment and Diagnosis
16—Robert A. Lee Long Beach, California	Cases Involving Tooth Reduction Using the Universal Appliance
17—Robert J. Gawley Alhambra, California Joseph Hyman Long Beach, California	The Universal Appliance as Used in Our Office
18—Robert R. McGonagle Euclid, Ohio	An Orthodontic Success
19—Walter Mosmann Hackensack, New Jersey	Occipital Anchorage—Diagnosis and Treatment
20—Pacific Northwest Orthodontic Study Club	
a—George A. Barker Seattle, Washington Howard J. Hammond Seattle, Washington	Prefabrication to Save Chair Time
b—Aldys J. Gray Los Angeles, California Arnold E. Stoller Seattle, Washington	Buccal Bars—Types and Uses
c—Donald E. MacEwan Seattle, Washington Arthur F. Skaife San Francisco, California	Spring Buccal Bars—Fabrication and Use
d—Elwood B. Faxon Portland, Oregon James M. Kennan Seattle, Washington	Removing Stresses From Cold-Worked Wire
e—Lloyd Chapman Vancouver, Canada	A Swager for Plastic Appliances
f—Richard Cline Vancouver, Canada Joseph E. Harrison Wenatchee, Washington	Uses of 90° Twists in Flat Wire
g—Vincent K. Davis Bellingham, Washington Thurman L. Hice Portland, Oregon	Coil Spring—Fabrication and Use

h—Ralph G. Cooper Portland, Oregon John P. MacKinnon Eugene, Oregon	Coil Spring—Fabrication and Use (additional)
i—Henry H. Bowman Inglewood, California R. Paul Husted Hermosa Beach, California	The "Twiniversal" Appliance
j—Benjamin E. Nickells Victoria, Canada	Simple Accessories in Universal Bracket Technique
21—Spencer R. Atkinson & Group Pasadena, California a—Raymond L. Cullen, San Diego, California b—Sakae K. Tanaka, Los Angeles, California c—Abraham A. Swerdlow, Los Angeles, California d—Robert G. Daniel, Madera, California e—Joseph F. Rose, Arcadia, California f—Clarence D. Honig, Los Angeles, California g—Donald L. Snedaker, Los Angeles, California h—William E. Saltz, Long Beach, California	Changing Facial Form
22—Frank S. Ryan Chicago, Illinois Robert W. Donovan Chicago, Illinois Vernon R. Boman Chicago, Illinois	Cephalometric Radiographic Analysis of Dentofacial Disharmonies Typodont Exhibit of Edgewise Arch Appliance Therapy Exhibit of Cases Treated in the Graduate Clinic of Northwestern University Illustrating Various Problems

On Wednesday evening a delightful reception and banquet were held, honoring President and Mrs. Frederick T. West.

This evening, with its fine entertainment and dancing, will long be remembered as a high light of the meeting.

Thursday Morning, May 12, 1955

Cleft Lip and Cleft Palate Symposium. "Responsibilities, Possibilities, and Limitations in Habilitation."

This important subject was pursued by the following panel numbers, each exceptionally well qualified in his field:

John R. Thompson, Chicago, Ill., Moderator.

Wayne B. Slaughter, M.D., Reconstructive Surgeon, Chicago, Illinois.

Kenneth F. Terwilliger,* Orthodontist, San Francisco, California.

Harold Westlake, Ph.D., Speech Pathologist, Evanston, Illinois.

The first meeting to be held on the Pacific Coast in a number of years closed with a business session. President West was presented with the past-president's key by the immediate past-president, James W. Ford of Chicago. The new officers installed were: president, Philip E. Adams, Boston, Massa-

*Due to the unavoidable absence of Dr. Terwilliger, Dr. John R. Thompson read this paper. Dr. Robert M. Ricketts participated as a panel member in the absence of Dr. Terwilliger.

chusetts; president-elect, A. C. Broussard, New Orleans, Louisiana; vice-president, Stephen Hopkins, Washington, D. C.; secretary-treasurer, Franklin A. Squires, New York.

Nominated officers for the following year were Franklin A. Squires, White Plains, New York, president; Earl E. Shepard, St. Louis, Missouri, secretary-treasurer; and William B. Stevenson, Sr., Amarillo, Texas, vice-president.

The attendance of the meeting amounted to approximately 500 orthodontists from all over the United States and several foreign countries.

The so-called 1,500-hour amendment making 1,500 hours of graduate training necessary for all candidates for membership in the A. A. O., carried by a vote of 117 to 92. This latter means that all candidates for membership in the future must have 1,500 hours of graduate orthodontic education on a university level to be eligible for membership.

Dr. William A. Murray, of Chicago, at the last business session, introduced an amendment which provides that in the future major questions pertaining to affairs of the A. A. O. may be referred to mail ballot vote by the entire membership on the recommendation of the Board of Directors of the A. A. O.

All in all, the San Francisco meeting was a great success and much credit is due the many officers and committees who put so much time and effort behind this meeting. Many orthodontists made tours of the western states subsequent to the meeting.

The next meeting will be held in Boston, Massachusetts, under the leadership of President Philip E. Adams and the exact date will be announced in an early issue of the JOURNAL.

E. E. S.

REPORT FROM YOUR A.A.O. GENERAL CHAIRMAN*

THIS is written shortly following the close of our long-awaited, long-planned fifty-first annual session of the American Association of Orthodontists, held in San Francisco's Fairmont Hotel, May 8 to 12, 1955.

We can now relax and rejoice in the cozy feeling that our Pacific Coast members, according to our guests, distinguished themselves. From all sides came showers of praise and compliments about our hospitality and presenting one of the finest meetings in our Association's history. Although we did not have the largest registration of any previous meeting, which would be expecting quite a bit, our out-of-state colleagues were amazed that our total attendance of over 1,000 was that high at a meeting held on the Pacific Coast.

To those of you who did not attend, you should know how your Local Arrangements Committee performed. Each person had been carefully selected as being best qualified for his assignment, and certainly this proved to be correct. Each department functioned conscientiously and capably, which brought forth innumerable comments that it was one of the "smoothest running" meetings ever attended. Our deepest gratitude goes to each and every one of them for their gracious willingness to serve and for the sacrifices they made.

You should know, too, that your president, Fred West, handled all duties of his office (and there were plenty) with dignity and efficiency, bringing forth many compliments to us and obviously making us very proud of him as our representative.

The scientific program consisted of an outstanding array of leading essayists and clinicians, and the capacity crowds at each session registered complete approval and enjoyment.

Likewise, each luncheon and evening social event brought packed houses. The traditional Golden Anniversary Luncheon was an enjoyable and inspirational occasion and the Round Table Luncheon—a P.C.S.O. innovation—was a "sell out," proving to be as popular as we had anticipated.

The hotel's Terrace Room virtually overflowed with the gay throng for cocktails (as guests of the Central Component) prior to the "Get Acquainted" dinner. This affair sparkled with good fellowship and joviality and guest speaker, columnist, and humorist Paul Speegle's wit had his audience in stitches.

The President's Reception and Banquet, honoring President and Mrs. Fred West, with the cocktail period (courtesy of P.C.S.O.) followed by dinner, floor show, and dancing, was the stellar social event of the meeting. As

*The above is a report on the San Francisco Meeting of the American Association of Orthodontists, held in San Francisco, California, in May of 1955. It was prepared as a report to the members of the Pacific Coast Society of Orthodontists by Dr. Reuben L. Blake, general chairman of the 1955 meeting. The report is published herewith at the request of the American Association of Orthodontists as a matter of general news interest.

a surprise feature to all of us, the catering department's capable chiefs, Henry and Werner Lewin, staged a spectacular flaming sword and ice sculpture procession by the dining room staff, much to everyone's delight. Several acts of entertainment by Hollywood talent, accompanied by a large name band, brought great enjoyment which was followed by dancing to a late hour.

During the evening, President West introduced distinguished guests at the speaker's table and graciously paid tribute to each and every committeeman for his part in producing the meeting.

Mention should be made of the Fairmont Hotel's excellent accommodations, its efficient and courteous service, and its delicious cuisine. Unlike the usual "mass production" hotel food, each meal had a distinction and unique quality easily observed and appreciated by all.

A major part of our hospitality program was devoted to the ladies, for whom many special features had been planned. The Complimentary Continental Breakfasts on two mornings were enthusiastically received by such an unexpectedly large group that the hotel was caught somewhat unaware in providing sufficient breakfast foods. The tour of San Francisco's world-famous Gump's Oriental Shop was oversubscribed, with the ladies evidencing great fascination and intrigue. Their luncheon and fashion show, presented through the courtesy of Joseph Magnin's smart women's apparel shop, was found delightful and exciting to all in displaying the latest in milady's wardrobe.

Probably the most popular and most enjoyed event of recreation was the Photographers Sightseeing Bus Tour of San Francisco, accompanied by an expert. Originally anticipated to attract one or perhaps two busloads of guests, it ended with six, making it necessary for the bus company to withdraw two of its buses from other suburban runs to accommodate all participants. With beautiful spring weather provided for our visitors, every passenger expressed nothing but genuine delight and enjoyment.

The commercial exhibitors presented a very fine display of materials and services, and they expressed appreciation for an attendance much greater than anticipated.

During the business sessions, the following matters on the agenda should be of interest:

Due to the excessive work load carried by the secretary-treasurer's office, it was voted that additional space and office help be granted to that office.

It was voted that the Education Committee be instructed by the A.A.O. to make a survey of the orthodontic curricula in the dental schools wherein those curricula are longer than 1,500 hours.

To assist that committee, which is composed of only three members, it was voted that a special committee or an advisory committee be appointed to cooperate with it, this special committee to be composed of three members who are not associated with dental schools.

It was voted that the A.A.O. request the Council on Dental Education of the American Dental Association to make a survey of the orthodontic curricula in the dental schools.

It was voted that a special committee of five be appointed to consider requirements for membership in the A.A.O. This action was designed to consider and study some alternative of preparation for membership with some form of preceptorship under greater control than in the past.

Subsequent A.A.O. meetings will be held in Boston, May, 1956: New Orleans, May, 12 to 16, 1957; and New York, 1958.

As you know, the American Board of Orthodontics went into session one week prior to the meeting, studying, evaluating, and certifying the new diplomates, of which there were twenty-seven. We should be proud that, of that group, seven were members of the Pacific Coast Society of Orthodontists.

The presentation of the Albert H. Ketcham Memorial Award was an impressive and inspiring ceremony, conducted by Raymond L. Webster, president of the American Board of Orthodontics. The award was presented to Joseph E. Johnson of Louisville, Kentucky, for his many contributions to the advancement of orthodontic science.

Thus ended an historic milestone in the life of our Society, that of again being hosts to the Annual Session of the American Association of Orthodontists. We may all feel justly proud that we gave our best efforts to provide for our visiting colleagues scientific advancement, recreation, and warm hospitality. We may feel rewarded, too, that it was a meeting which, by their own enthusiastic expressions, they will long remember.

Reuben L. Blake, D.D.S., F.A.C.D.

REPORT ON THE GOLDEN ANNIVERSARY LUNCHEON

THIS luncheon was again a high spot at the A.A.O. meeting in San Francisco. It was attended by 187 members.

Five new men became eligible for election, as they had been in practice for fifty years or more:

John L. Kaufman, New York City
William Walter Leslie, Fresno, California
Simon W. Sheffield, New York City
William H. Street, Richmond, Virginia
Arthur B. Thompson, Des Moines, Iowa

Seated at the head table were the master of ceremonies, Dr. G. Hewett Williams of Chicago, and three of the Golden Anniversary Group—Drs. Andrew F. Jackson, Charles R. Baker, and Robert H. W. Strang. Drs. Jackson and Baker gave very interesting extemporaneous talks.

Dr. Strang gave the luncheon address, which was most interesting. It was so outstanding (most characteristic of Bob Strang) that we believe its publication in entirety will be very worth while.

We were sorry that many of the G.A.G. members were unable to be present, due to conflicting dental meetings, illness, and so forth.

Letters were received from many of those who were unable to make the long trip to San Francisco. A few of these letters were read at the luncheon, but time did not permit reading many others.

A note from Benno E. Lischer read as follows:

> I deeply regret that I have to forego the pleasure and the advantages that attendance at our Golden Anniversary Luncheon would afford this year. There are good reasons why I should be present, for San Francisco was my home for three and one-half years during my active period of teaching orthodontics, and they were happy and productive years.
>
> Then there is the magnet of memories which calls one to the retreat of reminiscence, to the renewal of one's faith in progress, to actually relive the happy days among fine friends. But time, as allotted by the calendar, never ceases to move on. And so I find that other tasks and demands prescribe a course in May for me which conflicts with the days of our meeting in the ever delightful city of the Golden Gate.
>
> Permit me to extend greetings and best wishes for a successful meeting.

This sentiment was characteristic of many other letters.

The chairman regretted to announce that during the past year four members of the G.A.G. group had died:

Lawrence W. Baker, Boston, Massachussets
D. Willard Flint, Lake Worth, Florida
Allen H. Suggett, Santa Barbara, California
Albert E. Voss, Los Angeles, California

All in all, the luncheon was most enjoyable. A note from President Fred West to Charles Baker expresses the views of all those present: "The Golden Anniversary Luncheon was outstanding and you fellows deserve the credit for getting it started." (*Note:* It was really Ernie Bach who had the original thought of the Golden Anniversary Group.)

Many letters express the appreciation of the G.A.G. members for being honored in this fashion. The total G.A.G. membership is now 45.

GOLDEN ANNIVERSARY LUNCHEON.

Left to right: Andrew F. Jackson, Philadelphia, Pa.; G. Hewett Williams (master of ceremonies), Chicago, Ill.; Charles R. Baker, Evanston, Ill.; and Robert H. W. Strang, Bridgeport, Conn.

The following is the address by Bob Strang who, as the chairman said, "has worked enthusiastically for the advancement of orthodontics during the last half century. He is highly respected as a clinician, for his valuable writings (including a textbook), and as a teacher. Hundreds of orthodontists have been willing students in postgraduate courses which he personally directed. And, best of all, we are proud to be considered among his friends."

ADDRESS BY ROBERT H. W. STRANG

MR. CHAIRMAN, FELLOW GERIATRICIANS AND ASSOCIATES OF ANOTHER GENERATION:

It is indeed an honor to have the privilege of addressing you on behalf of my friends of the Golden Anniversary Group. Counting the number of fifty-year men on the program (that is, 45) and crediting each with fifty years of practice, you will note that 2,250 years of orthodontic service is therewith represented. And, as each one of us probably treated at least forty new patients a year, with dentitions of twenty-four teeth, we will have moved about 2,160,000 teeth during these fifty years and that is a lot of tooth movement.

We began practice during the period of trial-and-error orthodontics and continued, for many years, in such an environment. We primarily equipped ourselves with a can of impression plaster; a can of model plaster; a set of impression trays; a knife, square, and plane to finish our models; a camera; molar clamp bands; "E" expansion arch wires; brass and grassline ligatures; cement; and a few pliers.

With this armamentarium, we could expand dentures to a degree that would make you younger men open your eyes. We thought only in terms of tooth crowns. Tooth roots meant nothing to us—they were Nature's worries, not ours. It was up to the forces of occlusion to move them. All we had to do was to move the crowns into alignment, even if we laid them in a horizontal position by this tipping process. Then we had to have our retaining appliance all ready to insert the moment the active mechanism was removed or it would not fit the next day because of relapse.

These retaining appliances were our salvation. They were as sacred to us as idols were to the heathen, and they were as lasting and permanent as the Rock of Gibraltar.

What these simple appliances could do was amazing. By the products of their handiwork, we could grow basal bone and even enlarge the nasal passages by making the floor of the nose broader, thus solving the mouth breathing problems of the rhinologist.

Owing to the fact that we could establish a place in the dental arches for every malposed tooth, by expansion procedures, and were also positively certain that mechanical stimulation and functional stress would cause the bony bases of the maxillae and mandible to grow sufficiently to give adequate foundational support to these expanded arches, we abhorred extraction of dental units.

And did we know everything about normal occlusion? We certainly did! We would tell you the relationship of every inclined plane in the whole denture, without a moment's hesitation. All we had to do was to fit these inclined planes correctly and our job was completed. Dynamic occlusion and cuspal interference had no terrors for us, because we had never heard of these terms. It was not until some of you younger men came along and introduced this complication that our tranquillity was disturbed.

The next blow fell when we were made conscious of the fact that teeth had roots as well as crowns and these roots should be moved coincidentally with crown movement. This disturbing factor to our complacency necessitated throwing our simple two-by-four appliances into the scrap drawer and covering all six anterior teeth with bands to which were soldered vertical tubes. Three-piece arch wires went with this device and the middle segment had vertical spikes soldered to it which were supposed to enter these vertical tubes. I believe that everyone who tried to assemble this mechanism for the first time sweat blood and would have sold his practice for a nickel on that day. But this "pin and tube" appliance could move the roots all right. In fact, some of us moved the roots right out of the alveolar process in our enthusiasm for uprighting teeth; yet, some excellent work resulted from the use

of this mechanism. I would especially mention the outstanding results shown by the late Dr. George Grieve of Toronto, who mastered this device and used it as long as he practiced.

When we had learned to move roots as well as crowns by applying the bracket appliances which succeeded the "pin and tube" moral disintegrator, we were absolutely sure that we could make mandibles and maxillae grow by this mechanical force and also that we had anchorage problems completely solved.

The root movers had a field day for a short period, but the crown tippers upset the applecart when the late Dr. Ketcham produced radiographic evidence of root resorption associated with orthodontic treatment with root moving appliances. It took quite a few years for the root movers to live that one down.

Again our peace of mind was shattered by a chap by the name of Broadbent who, with his cephalostat, visualized normal growth patterns of the structures upon which we worked. He really took the ego out of us so far as our claims for making basal bone grow were concerned. We were told that bone grew in proportion to the potentialities of the various growth centers and not as a result of mechanical stimulation. Brodie and his students, by painstaking research, demonstrated that the only bone changes that our appliances controlled were limited to the alveolar process.

Throughout all these years we were seeing the results of our treatment disintegrate when retaining appliances were removed. This fact was certainly giving orthodontics a black eye from the viewpoint of the public, although we took it quite for granted and only hoped that it would not occur until the patient had moved to another city. Finally, it occurred to some of us that environmental muscles played an important part in molding denture form. It was noted that dentures exhibiting malocclusion were well stabilized because their environmental muscles were in balance. This being so, would not a treated case remain stable if this muscle balance was not upset? This thought led to the elimination of expansion of dentures in treatment and the acceptance of the necessity of tooth extraction, as advised by Tweed, if expansion was to be avoided in many cases and basal bone support obtained in treatment.

Testing this theory, cases were treated without expansion and no retainers were used after treatment and, lo and behold, stability was the result. Extraction, of course, was necessary in many cases to avoid expansion and improve esthetics.

Thus, step by step, I have brought you down through the fifty years during which we men have practiced and coincidentally visualized the progress which our specialty has made during this period.

I have done this in order that you younger men may more deeply appreciate the favorable position to which you are fortunate to be heir. I know that every man at the head table would have longed to have started the practice of orthodontics with all the knowledge that you now have at your disposal. We congratulate you on your good fortune and we know that you will

not remain inert and complacent with the knowledge which you now have, but will continue to seek added knowledge and to improve technical procedures in order that this wonderful specialty of ours will advance to higher pinnacles of success.

And now I would like to address a few words to my colleagues here at the head table, words that have been very helpful to me and which I hope will be to them.

It is reported that General MacArthur, wherever his headquarters were, placed over his desk three picture frames. One held a portrait of Washington; one a portrait of Lincoln; and the other, placed between these two, held a few inspiring paragraphs pointing out that youth is not a matter of age so much as one of attitude—that, regardless of age, one is as young as his faith, his ideals, his imagination, his self-confidence, and his hope.

With these stimulating words ever in mind, let us also remember that we old fellows still hold an advantage over our colleagues of younger age. We are fortified in our approach to treatment problems and procedures by knowledge and judgment gained by years of clinical experience. They can only attain this priceless endowment by duplicating our terms of service. With this high handicap, we are capable of meeting the challenge of younger years. Consequently, let us never be depressed because the years are flying by, but let us continue to meet the demands of service with vigor, fortitude, and confidence.

Lowrie J. Porter.

NOTES ON THE SAN FRANCISCO MEETING

CALIFORNIA, as usual, did a bang-up job in its handling of the fifty-first annual meeting of the American Association of Orthodontists. President Fred West and his efficient committee had everything well in hand and operating on a routine clockwork schedule.

The program has now been published in detail in the JOURNAL in order to create a published record of this meeting for all who were not able to attend.

The several luncheons and social events were very successful, and were well and enthusiastically attended. The get-acquainted buffet dinner was enthusiastically enjoyed and the guest speaker was Paul Speegle, a talented humorist.

The outstanding social event was the President's Reception, honoring Dr. and Mrs. Fred West. This was preceded by a cocktail period (courtesy of the Pacific Coast Society of Orthodontists) and followed by a beautiful dinner and floor show.

Remindful of the New York Waldorf and the Toronto York of some years ago, was the "flaming sword" procession by the dining room staff of the hotel. This introduction to what followed in the way of food and entertainment was the high spot of a wonderful evening devoted to fun and entertainment.

Another popular and unique event was the Photographers' Sightseeing Bus Tour of San Francisco. This event was scheduled for two busloads of out-of-town guests. At the last moment, however, six buses were required to take care of the crowd.

The famed Fairmont Hotel and its courteous staff obviously pleased everybody. In contrast to the usual complaints, nothing but praise was heard for the hotel service and treatment of the large group of more than 1,000.

Other Notes.—The Ketcham Award was presented to Dr. Joseph E. Johnson of Louisville, Kentucky, for his many and valuable contributions to the advancement of orthodontics over a long period of years. The presentation was made by Raymond L. Webster, president of the American Board of Orthodontists.

Twenty-seven diplomates were certified by the American Board of Orthodontists.

It was directed by the vote of the Association that the Committee on Education make a survey of the current orthodontic programs in dental schools.

It was also directed that an Advisory Committee be appointed to cooperate and advise with the Committee on Education and that this Advisory Committee be composed of three members who are not connected with dental schools.

It was also directed that the A. A. O. request the Council on Dental Education of the American Dental Association to make a survey of the orthodontic curricula in dental schools.

The so-called 1,500-hour amendment carried by a rather close margin. That is the amendment which provides that "a person who has been in the

exclusive practice of orthodontics for at least three years and has successfully completed an orthodontic course of a minimum of 1,500 hours in an approved dental school and is a member in good standing in his local, state, and national dental organizations may be elected to active membership through the constituent society. He must be recommended by two active members." This decision as to whether the amendment should or should not be adopted at this time was regarded as very important by many members.

One reason, no doubt, that the subject was brought to the floor during a subsequent session was the presumed attitude (later confirmed) of the Council on Dental Education of the A. D. A. with reference to limiting the number of dental specialties and redefining and segmenting the specialty areas. Anyway, it was directed by majority vote that a special committee of five members be appointed to consider further the requirements for membership in the A. A. O. This action was plainly taken in order that study may be given to some alternative plan of preparation for membership involving some form of preceptorship education under more strict formal requirements and control than have been imposed in the past.

Thus ended a delightful fifty-first session of the A. A. O., and members scattered in all directions to take a further view of fabulous California and the Pacific Coast. All were happy, and extended thanks for a wonderful meeting.

Subsequent A. A. O. meetings will be held in Boston, May, 1956, under the leadership of Phil Adams; New Orleans, May 12-16, 1957, under the leadership of A. C. Brussard; and New York, 1958, under the direction of our present efficient secretary, Franklin Squires. *H. C. P.*

It has been learned, just at the time of going to press, that Dr. Clinton C. Howard, formerly of Atlanta, Georgia, passed away in Miami, Florida, on July 16, 1955. A complete obituary will appear in a later issue of the JOURNAL.

Department of Orthodontic Abstracts and Reviews

Edited by

Dr. J. A. Salzmann, New York City

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Abstracts Presented Before the Research Section of the American Association of Orthodontists, San Francisco, May 11, 1955

An Evaluation of the Amount and Direction of Facial Growth During Orthodontic Treatment in Females of Different Ages: By George Swor Kendrick, B.S., D.D.S., M.S.D., Northwestern University, Chicago, Ill.

A quantitative cephalometric radiographic investigation of twenty-seven female patients between the ages of 11 and 17 years was made to determine facial skeletal and dental changes before, during, and subsequent to the orthodontic correction of the malocclusion. The records consisted of 106 lateral cephalometric radiographs with the teeth in occlusion on twelve Angle Class I and fifteen Angle Class II, Division 1 malocclusions. Age 11 was used as the base year and, by comparing the increment change, means were established for each year through age 17; graphs were constructed and results were interpreted therefrom. The following conclusions might be made: that point "b" does not keep pace with its bony base in a downward and forward direction; that point "b" moves downward and forward twice as fast as point "a" until 14.5 years, after which they progress almost equally; that menton moves in almost equal magnitude in a downward and forward direction; that projecting upper incisor to ab plane was less variable than NPo plane; that the mean change from angle SNa was a minus; that angle NSM was stable throughout the group; that angles abSN and SNb do not increase appreciably after 14.5 years; and that the greatest rate change (difference between the means) occurred between the ages of 13 and 16 in all linear measurements.

A Study of the Relation Between Nasal Emission and the Form and Function of Certain Structures Associated With Velopharyngeal Valving in Cleft Palate Individuals: By Alexander James Wildman, D.D.S., Hamilton, Ohio.

Quantitative study of the relation between abnormal nasal emission of air during speech and abnormal function of the velopharyngeal valving mechanism of cleft palate individuals has been hampered by the lack of an instrument capable of accurately measuring nasal emission.

The nasometer developed for this study was essentially a Marey tambour positioned to write on a smoked kymograph drum. The kymograph record was calibrated before and after each test by introducing pulsations of compressed air of known air pressure into the tambour. The nasometer was found to measure nasal emission reliably in cleft palate subjects during the production of consonant sounds.

The nasal emission of thirty cleft palate individuals between the ages of 13 and 23 was recorded during the production of certain plosive and fricative consonant sounds. Functional movements of the velopharyngeal valve were measured from composite tracings of lateral cephalometric radiographs taken during the phonation of the vowel "u" and during the inhalation of air.

The linear correlations between the values for nasal emission and the various measurements of the functional competence of the velopharyngeal valve were all significant at the 1 per cent probability level. The high linear correlations for those relations seemed to indicate that the method used was probably reliable and might be of clinical value in following cleft palate cases. The data seemed to indicate that the efficiency of the velopharyngeal valving mechanism was an important factor in the ability of the subjects to control nasal emission. This has been denied by some observers.

Thumb-Sucking and Dental Occlusion: A Serial Study: By Hillard I. Lerner, B.A., D.D.S., M.S. (Dent.), Child Research Council, Medical School, University of Colorado, Denver, Colo.

The study represents a serial analysis of the study models of sixty-four cases in an attempt to determine the effect of thumb-sucking on the developing dental occlusion. The chi-square (χ^2) test was employed as the statistical method of determining the significance of the data in this study. These methods of analysis and testing showed that thumb-sucking can cause a specific kind of deformity, usually involving the anterior component of the maxillary dental arch. This deformity seems to correct itself in the deciduous dentition, if the duration time for the habit is less than four years. If the habit exists for more than four years, the deformity appears to be maintained while the maxillary deciduous incisors are present. In the mixed dentition stage, there appears to be a strong tendency for the permanent dentition to overcome the thumb-sucking influence on the dental occlusion. Thus, the four-year level of duration of this habit does not seem to be critical. The evidence related to thumb-sucking as an etiological factor of Class II malocclusion was not conclusive. This and other conditions of dental occlusion, which may or may not be related to this habit influence, deserve further evaluation as more data are collected in future studies.

A Cephalometric Evaluation of Extraoral Anchorage: By Antonio Cucalon, Jr., D.D.S., M.D.S., Department of Orthodontia, University of Southern California, Los Angeles, Calif.

Twenty untreated cases of Class II (Angle) malocclusion were selected for this study. These patients were Caucasians, having an average age of 9 years and 5 months, with a range from 6 to 13 years. Eight were boys and twelve were girls.

These cases were then treated exclusively with extraoral force, both cervical and occipital, for the purpose of revealing the specific effect of these forces on tooth movement and growth processes. The average period of treatment was thirteen months, ranging from four to twenty-two months. "Before and after" cephalometric roentgenograms were taken, and tracings were made. Superpositioning on selected reference points was done in order to determine the results of growth and treatment.

It was found that through exclusive extraoral force:

1. The maxillary first molars were carried distally.
2. The nature of the movement was bodily distally and downward when using cervical traction.

3. Distal tipping was present in the cases treated with occipital anchorage, but no downward movement was observed with this type of appliance.

4. Extraoral anchorage does not produce any change in the position of the mandible. Forward tipping movement of the lower molars was not apparent.

5. This type of therapy should be used primarily to establish a correct relationship between maxillary and mandibular first molars.

6. Success depends upon growth and development, correct usage of the appliance, and the cooperation of the patient.

A Roentgenographic Anthropometric Evaluation of the Mandibular Apical Base: By Donald A. Rudee, B.S., D.D.S., M.S.D., University of Washington, Seattle, Wash.

This study is an attempt to define more accurately the mandibular apical base and to determine whether any relationship exists between its size and tooth size in both excellent occlusion and malocclusion.

Eighty-eight subjects were used—twenty-eight with clinically excellent occlusions; thirty with Class I malocclusion; and thirty with Class II, Division 1 malocclusion. Oriented, intraoral occlusal roentgenograms were taken of all subjects with the aid of a device which provided a 36-inch film-focal distance and consistency of angulation. The occlusal films were traced and the apical base was measured as the distance from the mesial of the first permanent molar to the mesial of the first permanent molar on the opposite side, bisecting the distance between the labial and lingual cortical plates. The widths of the premolar and incisor teeth were recorded and all data were subjected to statistical analysis.

SUMMARY

1. Within the occlusion groups, no correlation was found between apical base length and the sum of the tooth widths.

2. Significant differences were demonstrated between the occlusion groups. (a) The Class I and Class II, Division 1 malocclusion groups had greater tooth width than the excellent occlusion group. (b) The Class II, Division 1 malocclusion group, and the excellent occlusion group had greater apical base length than the Class I malocclusion group.

3. Crowding of the dental arches in the Class I group was attributed to the synergistic action of both shortened apical base and the greater tooth size.

4. Absence from crowding in the Class II, Division 1 group was attributed to the greater or optimum length of the apical base.

5. The mathematical values of the relation of apical base to tooth size, when plotted to differentiate crowded from uncrowded cases, demonstrate a great overlapping between the two groups.

6. X-ray films of plaster casts can produce results comparable to those of oriented occlusal films, provided attention is given to the establishment of a consistent occlusal plane.

Lateral Growth of the Mandible as Revealed by Serial Intraoral Roentgenograms: By A. U. Ricciardi, D.M.D., M.D.S., University of Southern California Dental School, Los Angeles, Calif.

An extraoral positioning instrument was constructed which holds an occlusal intraoral film in a fixed position relative to set measurements which correspond with known film-target distance, fixed angulation of the central x-ray, and fixed position of the mandible.

The roentgenographic rays are shot through the mandible from a point below its inferior border, producing a transverse section of the mandible on the film. This outline, being the result of divergent rays, does not represent a true transverse section at a given vertical point on the mandible but, rather, a composite outline made up of the most lateral points on the inner and outer cortical plates.

In the nontreatment Group I, two children, aged 3 and 4½, were under study for forty-eight months. Eight other subjects in this group, ranging in age from 7 to 14 years, were studied for eighteen months.

In Group II, thirty-two children under orthodontic therapy, ranging in age from 7 to 14 years, were studied for eighteen months or more.

Each series of serial roentgenograms was taken at intervals of approximately six months; these roentgenograms were traced on a single sheet of plastic tracing paper by superpositioning, as nearly as possible, the entire buccal and lingual outlines of each roentgenogram in each series.

The findings were as follows:

(1) Thirty-nine subjects experienced increased lateral growth, except for three in the orthodontically treated group. One case showed a decrease in lateral growth, and two remained the same.

(2) The greatest growth increase was noted in the 7- to 10-year-olds of both groups.

The growth changes observed were slow and slight, but definite. This study is being continued for more data before any significant observation can be made.

A Serial Cephalometric Analysis of the Skeletal and Denture Patterns of Children With Excellent Occlusions: By Lowell Conrad Lundell, D.D.S., M.S.D., University of Washington, Seattle, Wash.

A serial cephalometric study was made of children between the ages of 7 to 9 and 10 to 12 possessing excellent occlusion. The group was composed of sixteen girls and nineteen boys. Angular and linear measurements were made with the serial headfilms oriented on the sella-nasion plane.

The range, mean, percentage change, mean difference, and standard deviation were computed on all the observations. The "t" test was employed in comparing the groups at both age levels, between the sexes and within the sexes.

Statistical analysis of the data revealed that, between the ages studied, children of both sexes experienced slight similar changes in their skeletal and denture patterns. Significant changes in common included an increase of the facial angle, with the cant of the occlusal plane and the angle of the maxillary incisor decreasing. In girls, the angle of the axis of the upper and lower incisors increased significantly. Skeletal and denture angular relationships between the sexes at both age levels did not alter significantly. A comparison of the linear measurements between boys and girls revealed four significant differences at both ages tested. The boys consistently showed significantly larger values for the measurements, nasion to points a and b, nasion to menton, and sella to nasion. The growth realized in girls was slightly in excess of that evidenced by the boys.

The results of this paper indicate that, for the growth period studied, both sexes experienced corresponding developmental changes, with the boys maintaining larger facial patterns.

Growth Differences of Depleted Rats Fed Processed and Unprocessed Milks: By Abraham Swerdlow, D.D.S., and Lucien A. Bavetta, Ph.D., University of Southern California School of Dentistry, Los Angeles, Calif.

The nutritive value of several different types of milk were compared in a study on white rats. Five groups of rats, depleted on a nonprotein diet, were repleted on diets wherein the only source of protein was milk. The effects of raw, homogenized-pasteurized, and evaporated milks on the growth, bone calcification, and blood picture of these rats were studied and the results were compared with similar data on a control group on a regular laboratory diet.

The rats were depleted on a nonprotein diet for twelve days and then oriented to a high liquid intake. In the repletion stage of the experiment, the milk-fed rats were offered identical volumes daily and the amount consumed by each rat was measured. The total protein intake of any group, computed at the end of the experiment, varied little from that consumed by each of the other groups.

The results showed almost identical growth curves, no significant variation in the blood picture, and no differences in calcification in any of the groups.

Histochemical Studies on Long Bone and Dentine of Tryptophane-Deficient and -Depleted Rats: By Clarence D. Honig, B.A., D.D.S., University of Southern California, Los Angeles, Calif.

Rats of the University of Southern California strain were placed on a tryptophane-deficient diet for seven weeks, and repleted for four additional weeks before they were sacrificed. A disturbance in the calcifying process was observed in the long bones and dentine of the tryptophane-deficient animales, with a return to normal calcification in the hard tissues of the repleted animals. The following histochemical methods were used to determine the morphologic alterations which are not visible by the routine histologic stains: (1) periodic acid-Schiff reaction for mucopolysaccharides and (2) toluidine blue for metachromasia. The epiphyseal plate of the long bones of the deficient animals was markedly narrow as a result of a depolymerization of the ground substance of the cartilage, and a disappearance of intracellular glycogen in the cartilage cells, as demonstrated by the histochemical methods, was noted. The epiphyseal plate of the repleted animals exhibited an acceleration in the proliferation of the cartilage.

The dentine of the incisors of the deficient animals showed histologic evidence of an increase in interglobular spaces, whereas that of the repleted animals appeared normal. The findings of the histochemical tests reveal that the ground substance became depolymerized, thus preventing proper calcification.

(The above research was done in association with Lucien Bavetta, Ph.D., and Sol Bernick, Ph.D., School of Dentistry and School of Medicine, University of Southern California.)

The Variation of Mandibular Bone Development in the Rat Resulting From the Excision of the Anterior Bellies of the Digastric Muscles: By Raymond L. Cullen, D.D.S., University of Southern California, Los Angeles, Calif.

Two litters of the University of Southern California strain of rats, eight males and eight females, maintained in identical environments on a diet of powdered Purina and tap water, were divided into control and experimental

groups. Food consumption, water intake, and weight gain records were kept. All rats were subjected to a mid-line incision, submandibular region, on the twenty-seventh day post partum. Ether anesthesia was employed. The anterior bellies of the digastric muscles were resected from the experimental animals. The mid-line incisions were sutured. Two females (one control, one experimental) did not survive the operations. The remainder recovered uneventfully.

Control and experimental rats of each sex were sacrificed on the forty-seventh, seventy-first, ninetieth, and one hundred fourteenth days. Mandibles and right femurs were obtained from each animal, cleaned, and photographed.

Observations: (1) A noticeable difference in the contours of the control and experimental rats was evident. (2) The loss of the anterior bellies of the digastric muscles at twenty-seven days post partum did not retard over-all growth and development of the rats. (3) Marked impairment of function persisted for eight days, postoperatively, in the resected animals. (4) Some impairment of function was clinically evident in all experimental rats, as compared to the controls.

Conclusions: (1) Further substantiation of previous research is demonstrated, showing that muscle stress is an important factor in bone morphology. (2) The loss of the anterior bellies of the digastric muscles in rats results in impaired function of the masticatory apparatus. (3) Growth and development of an organism can proceed despite impairment of function of the masticatory apparatus so long as food assimilation and utilization can be maintained.

(Additional abstracts presented before the Research Section of the American Association of Orthodontists in May, 1955, will appear from time to time in forthcoming issues of the Journal.)

News and Notes

American Board of Orthodontics

The American Board of Orthodontics held its annual five-day meeting in San Francisco, California, May 3 through 7, 1955, for the purpose of conducting routine business and examining candidates aspiring to certification.

The unanimous choice for the new director to be appointed to the Board was Jacob A. Salzmann, New York City. Dr. Salzmann replaces Dr. Raymond L. Webster, whose term of office expired at the time of the San Francisco meeting and who served as president of the Board during his last two years of service.

In its final session, the Board adopted by acclamation the following tribute:

> The Directors of the Board wish at this time to officially recognize the valuable services to the Board of our retiring President, Dr. Raymond L. Webster. This is the second time Dr. Webster has served in this capacity, and in each instance he has given unstintingly of his time and energy, and has shown unusual foresight and wisdom in the conduct of his office. Attesting to this, all the Directors of the Board extend to him their deep appreciation and thanks.

In view of the fact that some applicants for certification have extended, without apparent good reasons, the length of time between their application and their ultimate appearance for examination, the Board adopted the following policy for the future:

> The right is reserved by the Board to assess, over and beyond the initial application fee, the sum of $25.00 for each year's extension of time.

The purpose of this action was not to provide additional extensions of time, for it does not alter the established rules concerning the already generous deadline. Rather, it seeks to encourage the practice of applying for the Board examination in one year and appearing before the Board the following year, an orderly procedure which many men have found quite workable. The Board purposely made the rule discretionary rather than mandatory, so that the Board might take into account individual extenuating circumstances.

Certification was granted to twenty-seven candidates as follows:

Walter Karl Appel
Murray L. Ballard
Harold S. Born
Maurice A. Burnley
Clarence W. Carey
Fred F. Crutcher
Leon Diskin
William B. Downs
Maxwell Stanford Fogel
John Peter Garvey
Reed A. Holdaway
Kenneth Eugene Holland
Nicholas A. Ippolito
Frank Kanter
David H. King
Gilbert Herman Miller
Alton Wallace Moore
Joseph J. Murray
Herbert Paskow
Elbe B. Pulliam
Richard M. Railsback
Earl Wiley Renfroe
Lewis Woodington Robinson
Louis Schwartz
Mouldon B. Smith
Norman S. Snyder, Jr.
Benjamin Weiss

The next meeting of the American Board of Orthodontics will be held at the Statler Hotel in Boston, Massachusetts, April 24 through April 28, 1956. Orthodontists who desire to be certified by the Board may obtain application blanks from the secretary, Dr. Wendell L. Wylie, University of California School of Dentistry, The Medical Center, San Francisco 22, California.

Applications for acceptance at the Boston meeting, leading to stipulation of examination requirements for the following year, must be filed before March 1, 1956. To be eligible, an applicant must have been an active member of the American Association of Orthodontists for at least three years.

Central Section of the American Association of Orthodontists

The next annual meeting of the Central Section of the American Association of Orthodontists will be held Oct. 2, 3, and 4, 1955, at the Hotel Savery in Des Moines, Iowa.

Great Lakes Society of Orthodontists

The next meeting of the Great Lakes Society of Orthodontists will be held at the Neil Hotel in Columbus, Ohio, Oct. 30 through Nov. 2, 1955.

Middle Atlantic Society of Orthodontists

The Middle Atlantic Society of Orthodontists will hold its next annual meeting Oct. 5, 6, and 7, 1955, at the Shoreham Hotel in Washington, D. C.

Northeastern Society of Orthodontists

The next meeting of the Northeastern Society of Orthodontists will be held Monday and Tuesday, Oct. 24 and 25, 1955, at the Hotel Commodore in New York City.

Pacific Coast Society of Orthodontists

The Pacific Coast Society of Orthodontists will meet in Seattle, Washington, Aug. 13 to 15, 1956.

Southern Society of Orthodontists

The Southern Society of Orthodontists will meet in Charlotte, North Carolina, Sept. 25 to 28, 1955.

Southwestern Society of Orthodontists

The next meeting of the Southwestern Society of Orthodontists will be held in Wichita, Kansas, at the Broadview Hotel, Oct. 16 through 19, 1955.

Denver Summer Meeting

The program for the Eighteenth Denver Summer Meeting was held at the Park Lane Hotel, Denver, Colorado, July 31 through August 5, 1955. The meeting was opened with the usual complimentary dinner.

The program follows:

SILAS J. KLOEHN, clinical practice of orthodontics, Appleton, Wisconsin, formerly on the staff of the Graduate Department of Orthodontics, University of Illinois.

Subject:

1. Guiding Growth and Eruption.
2. What Is the Best Age to Start Orthodontic Treatment?
3. Problems, Errors, and Contraindications of the Method of Treatment in Guiding Growth.

ROBERT E. MOYERS, Professor of Dentistry (orthodontics), School of Dentistry, University of Michigan, Ann Arbor, Michigan.

Subject:

1. Some Recent Studies on the Development of Occlusion.
2. Orthodontic Diagnosis During the Mixed Dentition.
3. Centric Relation and Orthodontic Therapy.
4. Muscles and Malocclusion.

RAM S. NANDA, Research Fellow in Orthodontics and Growth, Child Research Council, University of Colorado School of Medicine, Denver, Colorado.

Subject:

Investigations on the Eruption of Teeth.

PHILLIP H. STARR, Director, Community Child Guidance Clinic of Washington University, School of Medicine, St. Louis, Missouri.

Subject:

1. The Psychological Aspects of Thumb-Sucking.
2. Perspectives in Child Psychiatry and Their Application to Orthodontic Practice.

CHARLES H. TWEED, who conducts graduate course in Advanced Orthodontics under the auspices of the Charles H. Tweed Foundation for Orthodontic Research, and is clinical orthodontist in Tucson, Arizona.

Subject:

1. The Application of Orthodontic Therapy Principles in Treatment. Have They Been Validated by Scientific Research?
2. When and When Not to Begin Treatment. The Interception and Prevention of Some Types of Serious Malocclusions.

Fifteenth Annual Research Award Competition
Chicago Dental Society

The Chicago Dental Society offers an annual prize of $500.00 for the most meritorious essay of an original investigation containing *new and significant* material of value to dentistry.

Eligibility.—The competition is open to any member of the American Dental Association, a recognized foreign dental society, student, or other person of scientific attainment affiliated with a recognized institution in the field of dentistry.

Presentation.—The author of the winning essay will be invited to present it at the ninety-first midwinter meeting of the Chicago Society in Chicago, Feb. 5 to 8, 1956.

Application.—Application to enter competition must be filed in the office of the Society before Sept. 1, 1955. This form, as well as complete contest rules, may be secured by writing the Chicago Dental Society, 30 North Michigan Ave., Chicago 2, Illinois.

Closing Date.—Manuscripts of all essays must be received not later than Oct. 1, 1955.

The Chicago Dental Society reserves the right to omit the award if, in the judgment of the Award Committee, none of the entries is worthy.

Federal Trade Commission

The Federal Trade Commission, Washington, D. C., made a release on Tuesday, June 7, 1955, in regard to the proposed Trade Practice Rules for the commercial dental laboratory industry.

Notice of hearing and of opportunity to present views (suggestions or objections) were set for June 24, 1955, Room 332, Federal Trade Commission Bldg., Washington, D. C.

[The industry for which trade practice rules are sought to be established through these proceedings is composed of persons, firms, corporations, and organizations engaged in the design, formulation, and fabrication under written or oral authority, and/or from impressions, casts, or models, of a licensed practitioner of dentistry, a licensed medical physician, or other authorized person, of orthodontic corrective appliances, prosthetic dental appliances, ceramic or plastic teeth encapments, cast-metal dental appliances, dental inlays, dental bridges, and other types of oral restorations.]

These proceedings were instituted pursuant to an industry application and have for their purpose the establishment of a comprehensive set of trade practice rules directed to the maintenance of fair competitive conditions in the industry and to the elimination and prevention of such acts and practices as are deemed violative of statutes administered by the Federal Trade Commission. A general trade practice conference for the industry was held in New Orleans, Louisiana, and this announced hearing constitutes a further step in the proceedings.

Fred McKay, Orthodontist, Honored for Pioneer Work in Fluoridation

Drs. Frederick S. McKay of Colorado Springs, Colorado, and William L. Hutton were honored by the Detroit District Dental Society for their pioneering work in fluoride research.

Dr. McKay is one of the original pioneer orthodontists in America. He studied early in the century at the Angle School of Orthodontia in St. Louis, and practiced orthodontics in St. Louis and later in Colorado Springs for many years. He also practiced periodontia in New York City. Dr. McKay is credited with the original observation that mottled enamel was more resistant to dental caries than normally calcified teeth. He first attracted national attention after making a study of the mottled enamel and classical symptoms of the teeth of many children at that time who were born in Colorado Springs.

In an address, Dr. Hutton said that after nearly ten years of fluoridation at Brantford, Ontario, "there are no ill effects whatsoever." Other speakers at the ceremonies included Dr. H. Trendley Dean, of Chicago, secretary of the American Dental Association Council on Dental Research and one of the early workers in fluoride research; Dr. Philip Jay, of the University of Michigan School of Dentistry at Ann Arbor, and Dr. Thomas Parran, dean of the Graduate School of Public Health at the University of Pittsburgh and former surgeon general of the U. S. Public Health Service.

Dr. McKay, on account of his pioneer work in the study of fluorides, received an honorary degree from Western Reserve University in Cleveland, Ohio, June 15.

General Hays New Army Surgeon General

Major General Silas B. Hays, Army Medical Corps, was sworn in as the thirtieth Surgeon General of the Army on June 1, 1955, in Washington, D. C.

The ceremony took place in the office conference room, which was crowded with visiting dignitaries from other government agencies and private organizations.

The oath of office was administered by Major General John A. Klein, the Adjutant General. After taking the oath, General Hays said that he wanted to make an additional pledge, namely, "to continue the high professional standards which the organization had achieved under General Armstrong."

General Hays, who has been Deputy Surgeon General for the past four years, replaces Major General George E. Armstrong whose statutory term expired May 31 and who is scheduled to retire from the Army in August of this year.

During World War II, General Hays served as Chief of Medical Supply in the European Theatre of Operations, and in the early stages of the Korean War as Surgeon, Japan Logistical Command.

Notes of Interest

Homer A. Dahlman, D.D.S., announces the removal of his offices to 444 Wall St., Chico, California, practice limited to orthodontics.

Dr. Samuel J. Lewis announces the removal of his offices from 704 American National Bank Bldg. to 2901 South Westnedge Ave., Kalamazoo, Michigan, practice limited to orthodontics.

Dr. Earl F. Lussier announces the association of Dr. Maurice A. Bliss in the practice of orthodontics, Medical-Dental Guild Bldg., 36 So. El Camino Real, San Mateo, California.

Robert F. Taylor, D.D.S., M.S.D., announces the opening of his office at Suite 203, 1085 Madison Ave., Memphis, Tennessee, practice limited to orthodontics.

Dr. G. C. Turner and Dr. J. E. Makins announce the removal of their offices to Suite 1601, Great Plains Life Bldg., Lubbock, Texas, practice limited to orthodontics.

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THE AMERICAN JOURNAL OF ORTHODONTICS is the official publication of the American Association of Orthodontists and the following component societies. The editorial board of the AMERICAN JOURNAL OF ORTHODONTICS is composed of a representative of each one of the component societies of the American Association of Orthodontists.

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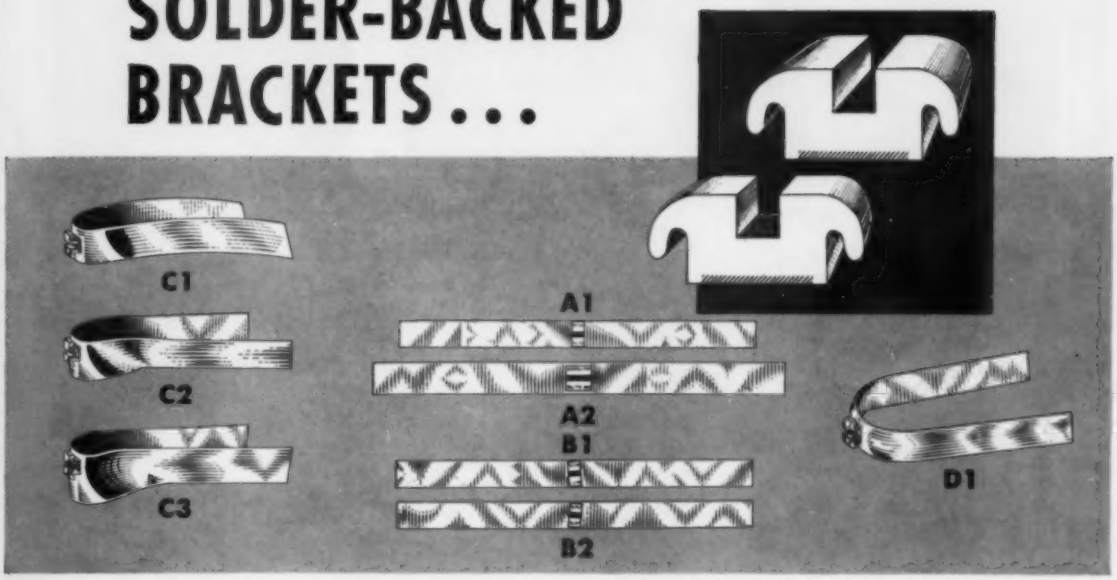

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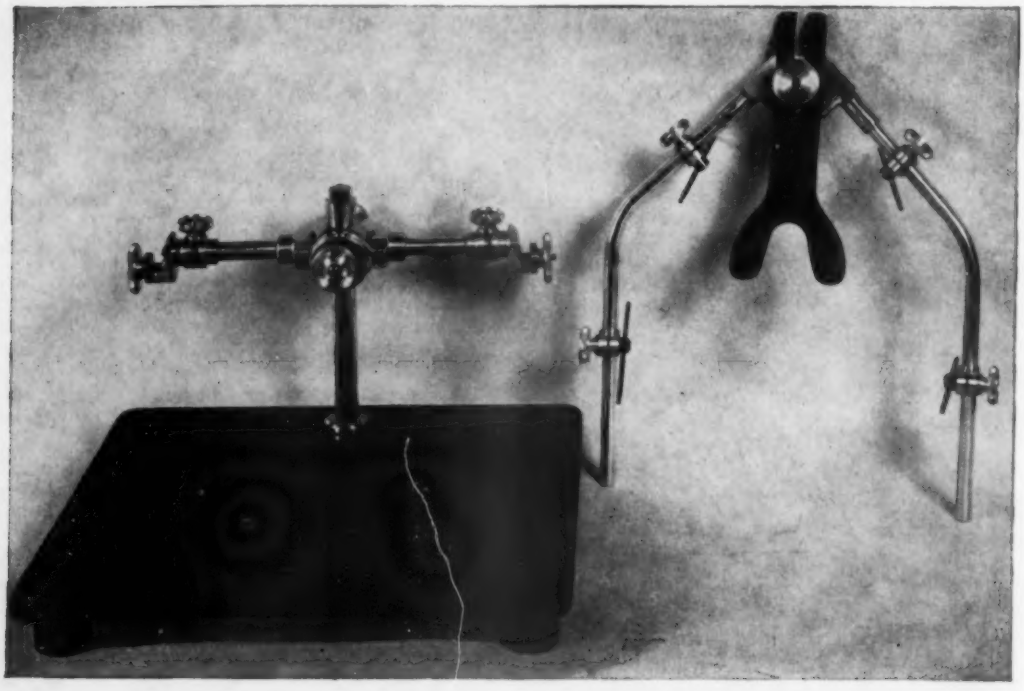

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